

Pollinaria 2017

Materials and Methods

Pollinaria of the Hoya flower are very small but the five dark brown colored retinacula are readily visible in the crown of the hoyia flower without the aid of magnification. In working to remove the pollinarium I use a “Swift” binocular microscope with 10x magnification. With the sharp end of a fine sewing needle inserted under the outer end of the retinaculum, a gentle lift will usually release the entire structure intact (I now use the end of a hypodermic needle). Those removed are placed on a slide with a 1 mm imbedded graduated scale, as a measuring device, divided into microns (100 parts). The slide is wetted with a drop of Kew solution (Alcohol, glycerin, water, and formaldehyde). The removed pollinaria are easily transfer to the wetted area. Most pollinarium can be examined at thirty power or above. At around 30-40 magnifications the pollinarium are easy to focus since the field depth is relatively small. An overall view is good at these magnifications.

I have found that a magnification of 100 power is best for detailed study of most hoyia pollinarium. For this I use a Bausch & Lomb monocular scope. It is provided with a EW 10 XD/20.50 -14.5 mm eyepiece. The 10x lens is 0.25. By the time the pollinarium is in good general focus in a SLR camera the magnification with this lens combination is approximately 160x (actually it is slightly more than 162) (now use a digital camera, no adaptor needed). My camera is provided with a microscope adapter, which allows me to switch from the Swift binocular scope (for extraction) to the monocular for measurements and photography. The camera mounts on the eyepiece, and the SLR feature allows visual focusing through the microscopes lens system.

Problems encountered: At near 100x magnification even though the pollinarium is a small object (we are dealing with fractions of a millimeter) the depth through which you must focus becomes greater (the depth of field is shallower). This requires a number of photos at various focal planes to record all the features. Thus presentations must be of a number of photos or composites. The retinaculum is especially deep i.e. three dimensional and thick, especially at the head and central portion. The photos (copies) in the data pages are a best average photo depiction of the structure or a composite in a few cases. At 165 magnifications some pollinarium are too large to fit within the view area and thus must be a composite of at least two photographs.

Problem areas in addition to the above are:

- (1) When removing pollinarium, both pollinia do not always stay adhered to the caudicle. In some instances neither of the two pollinia may remain attached. The longer the flower is open the more this becomes true.
- (2) Occasionally, especially from herbarium material, the pollinia may be withered (not the general situation). Preserved dry flowers must be thoroughly soaked in Kew solution (or boiled) before removal is practical.

- (3) Destruction of the pollinia (since it represents high protein) by bupestids or other insects is occasionally encountered.
- (4) A few pollinarium, especially very large ones, have a tendency to lie at a 45° angle to the surface of the slide when still attached to the caudicle, so to measure their true width, they must be separated from the caudicle and then maneuvered to lay flat.
- (5) One must work quickly since the heat from a strong light source will start to deform (wither) the pollinia even when in the Kew solution on a slide.
- (6) Upon extraction from the anthers the pollinia and retinaculum often twist and turn. This is especially true of translators located well down the retinacular column. It becomes a real challenge to get them to lie in their original configuration, and flat on the slide. Long retinaculum with the translators attached well down on the column tend to raise their head (the inner apex) above the slide surface, adding to the depth of the focal plane. This adds to the difficulty of getting a single clear photo of the structure. In some cases the twisting is almost impossible to undo. Drying the slide is an aid and using two needles for manipulation helps. The pollinarium of course can be studied from the top (normal positioning) or turned on its back and studied from the bottom.

I have been using 100 ASA color film or recently 200 ASA speed color film. The faster speed film cuts down on the exposure time (and thus camera battery renewal). I at first used the auto exposure meter of the camera but learned that most photos were overexposed (more true for floral parts than of the pollinarium through the monocular scope). With a tensor lamp directly below the stage, directed up through the field it takes only a fraction of a second for full exposure, possibly 1-2 seconds. I now use the bulb camera setting. Photos show more and clearer detail than the photocopies or scanned images presented here but are too expensive to use in this presentation.

Pollinarium Formation

The pollen of the hoyia species I have examined are coalesced into gelatinous masses. (It is not powdery). Each mass is covered with a continuous clear, rather tough membrane. The containing receptacle is a pocket (at first an closed envelope) in the side of the triangular membranaceous anther. This anther is fused in its central basal region above to the lower surface of the inner coronal lobes basal portion and along the edge of the stylar table between the fused stigmas. The (anther) apical triangular and lateral edges being free. The anther points inward toward (and often covers the stylar region) the center of the flower. There are two pockets in each anther's apical region arranged in a fashion, so as the upper (inner) ends are nearly touching, forming a triangle that thus follows the outline of the anther edge. The edges of the envelope are thickened and buttery yellow in color. These pockets are somewhat linear as are most pollinia. It is in these pockets that the pollinia form at a very early stage of

flower development even prior to the development of the corona. The sepals are still covering the whole floral bud and the corolla has not begun to enlarge beyond the calyx. At this stage the sepals are the most visible structure of the developing flower bud. At this early period the pollen masses are gelatinous, turgid, undifferentiated, uncolored masses; shortly developing a pale yellow color, and gradually solidifying.

The pollen masses early on are completely covered by the anther envelope and sealed within it. As development continues the pollen mass deepens in color (yellow) and differentiates into characteristic parts. Eventually the envelope separates along the outer edge freeing the enclosed pollinium, which however remain in place unless disturbed. A sterile edge of varying length differentiates along the edge of the pollinium adjacent to the inner envelope edge (its narrow side). This is the thinnest portion of the pollinium as seen in cross section. This pellucid, sterile edge differs in structure and length among the various *hoya* species. It is absent in the *Section Eriostemma* Schlechter (now Genus) species (now given Genus status 2001); very rudimentary in the *Section Rudimentalia* Kloppenburg (as exemplified by *Hoya darwinii* Loher). In most species it is well defined and readily visible under a microscope even at low power. This has been called the “germinal mouth”. One more bit of structural detail (taxonomic): The groove formed by the anther pockets two surfaces (envelope like) is not just a “V” shape. As a result of irregularities in this groove if you cut a pollinia crossways you will find irregularities in the surface of the pellucid edge (the curvature is not continuous) its development conforming to irregularities of the groove (See photos on page 11). In many cases there is a linear vacuole separating this edge and the gelatinous pollen, either partially or nearly completely. Upon germination the pollen tubes burst forth (usually) first at the inner end, the end nearest the retinaculum, of the sterile edge where a pore is present allowing honeydew to enter. Almost immediately, however the whole side splits with emerging pollen tubes.

If germination occurs near the stigmatic receptive area the whole bundle of individual elongating, translucent, colorless, pollen tubes are directed to the small stigmatic receptive area. What starts off, as a flat linear formation of pollen tubes emerging along the entire length of the sterile edge (germinal mouth) becomes a coalesced tubular shaped grouping all entering the stigmatic cavity. From here they proceed to elongate through the moist loosely differentiated tissue which leads from the receptive area to the top of the ovaries enveloped in the stylar material.

There are ten stigmas (decagynous) in *hoya* fused into pentamerous pairs (or possibly 5 stigmas with split ends). At the outer corners (edge) of the pentagonal stylar table the fused stigmas form a short barely discernible groove. This is on the upper side of the receptive area. Secretions from this grove give rise to the retinaculum. The surface of the stigma upon which the retinaculum is formed belays a raised spongy, although structurally coherent, template of the retinaculum. At a very early stage of flower development, just after the pollinia are visible as gelatinous masses, the stigma begins to secrete the retinacular structure. I have arbitrarily termed this (Stage 2). At this time the upper surface of the retinaculum begins to form. The inner apical (head) portion is continuous from secretion of the inner end (proximal) of the stigmatic grove. The two

sides of the retinaculum are at first free and bisymmetrical, forming from lateral secretions of the stigmatic groove. This upper surface eventually fuses as maturation continues. The outer ends remain free and curve slightly outward from the median line. They also curve over the edge of the fused stigmas toward the underlying receptive area. The whole structure at first is pale brown and somewhat soft then becomes horny and dark brown, becoming very rigid. Gelatinous material in a semi-structured condition at the end of the twin extensions remains un-solidified.

As the corolla formation is completed and the flower is just ready to open (anthesis) the formation of the retinaculum is complete, and the pollinia are released from the anther envelopes (stage 4). At this stage the retinaculum is a three dimensional structure with a tubular cavity in from the outer (distal) apex, the lower surface of this channel (the under side of the retinaculum) is shorter than the upper (dorsal) surface with its projected extensions. This surface may be flat or slightly rounded. This lower surface thins as it reaches its rounded outer extremities. Through the top view on a microscope it appears as a rounded end of the retinaculum (the lower surface; end furthestmost from the head). In addition to this central tube there are two side tubes, one on either side. Usually these side tubes are 45 degrees to the main axis and the central tube, but not connected to it. It is in these side tubes that the translator arms and caudicle are attached at the inner end. This allows for twisting and turning of the attached structures when the pollinarium is removed from its housing. The caudicle is attached above the translator. Both of the attached ends being tubular in shape, attached to the outer side of the wall forming the central retinacular tube.

The translators and caudicles are secreted at about the time the corolla begins to emerge from the surrounding calyx (Stage 3). They develop along the groove formed by the fused lower side of the anther, thus connecting the retinaculum to the pollinia. Each retinaculum has two translator arms and associated caudicles that connect to two pollinia each housed in (different) adjacent anthers. The clear sticky caudicle is supported by the translator. The translator is wedge shaped, conforming to the space between the anther and style, with its wider concave top supporting the caudicle. It is structurally more sound than the more fluid sticky caudicle. The latter in many cases is in the shape of a comma with the bulbous end into which the basal end of the pollinium adheres. Both of these parts of the pollinarium show individuality and differ widely among the various hoyia species. I have never observed a hoyia species lacking either structure. In some species the caudicle itself shows differentiation of its surface similar to that found in the translators, and also with some structural differentiation. The diversity presented, in the following photomicrographs, shows what a critical and important tool for taxonomic identity the pollinarium is. In herbaria material it is the one floral part that may remain intact without distortion or change. Upon soaking of the flower in the Kew solution (or boiling it up, not preferred) it can many times be removed for study intact.

At flower opening the pollinia are usually tightly affixed to the caudicle. As the flower ages this bond becomes less. In older flowers, while removing the retinaculum from a open flower, the pollinia may separate easily from the caudicle. On the following pages I have tried to break the pollinarium development into stages and show photomicrographs related to each stage.

Dr. Rintz (The Peninsular Malaysian Species of Hoya) in The Malayan Nature Journal 30:1978, 10 divided pollinarium into four groupings. (1) Both caudicles and pollinia winged. (2) Only pollinia winged. (3) Neither caudicle nor pollinia winged, caudicles long. (Section Eriostemma now a Genus) (4) Neither caudicles nor pollinia winged, caudicles short. By winged he is referring to the sterile edge of the pollinia or the translator supporting the caudicle. I have found caudicles and translators on all the species I have photographed in his grouping (2). In addition there is a rudimentary (very short) sterile edge on the species *Hoya mitrata* Kerr (and also *Hoya darwinii* Loher), his grouping (4). Of the pollinarium I have so far examined I have yet to find any without either a translator or caudicle as I define them. I feel either Dr. Rintz was using a low powered microscope or not studying the material in detail. It appears as far as the sterile edge is concerned the Section Rudimentalia Kloppenburg species represent a near loss (or beginning) of this structure among Hoya species.

In discerning the caudicle, since in most cases it is a clear almost transparent structure, it may be necessary to check closely at different focal planes in order to detect its presence. It is in some cases below the more opaque translator and thus hidden. I have found the use of dye helpful in differentiating these complex structures and especially useful in photographing parts that are all of the same color but different consistencies.

Corona of a Hoya Flower

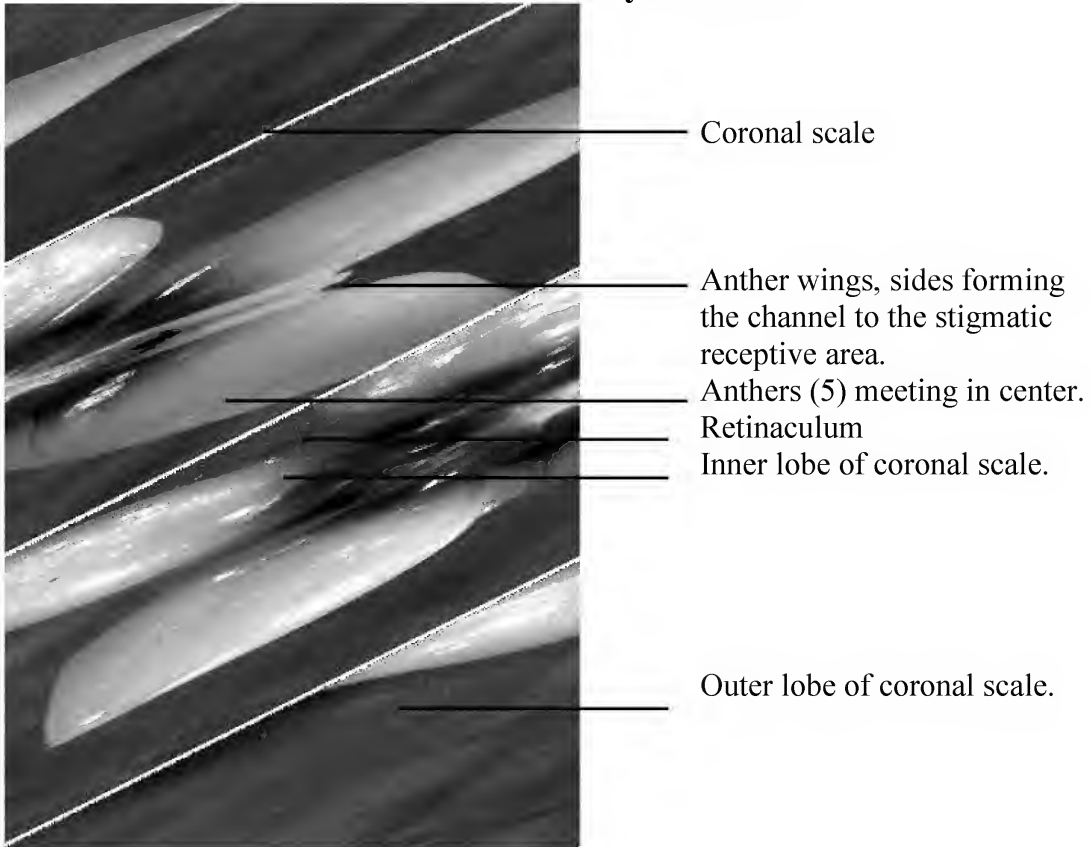
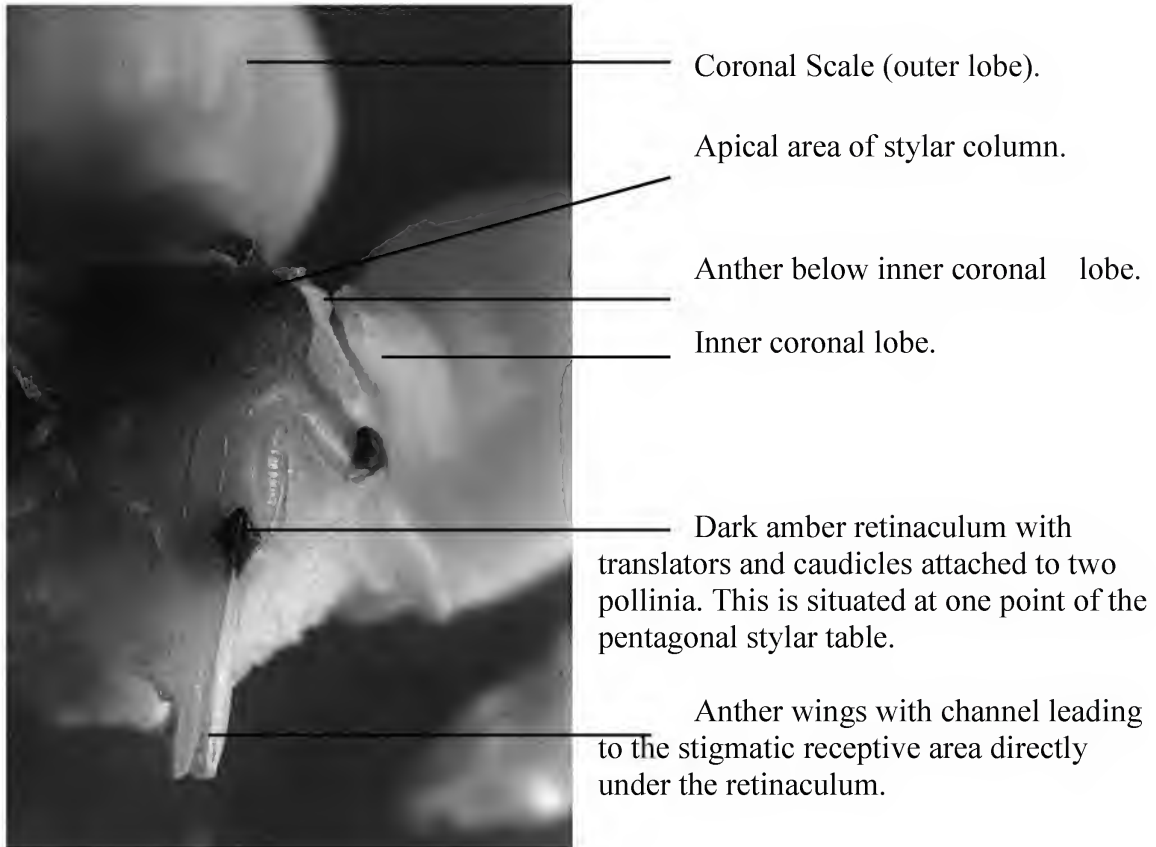


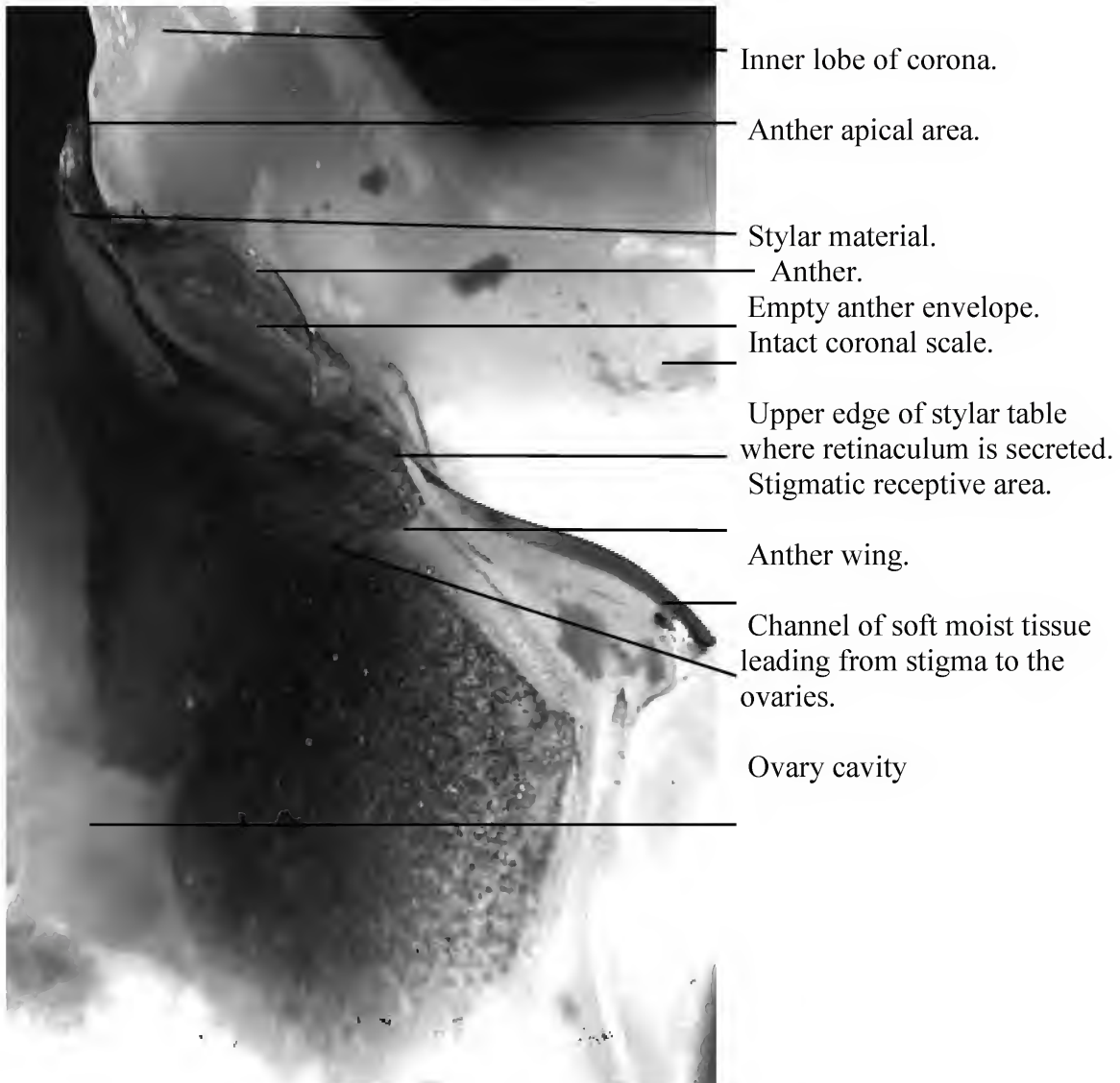
Photo of hoya flower crown (corona), a top view magnified approximately 15 times.

Stylar Table of the Hoya Flower



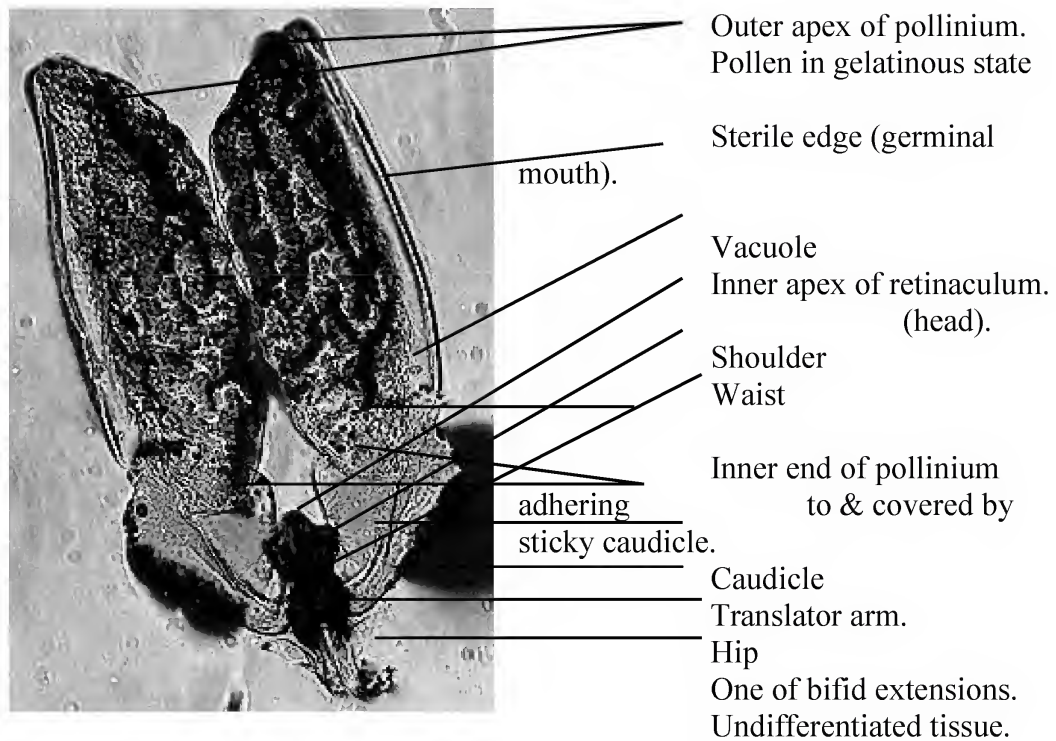
Picture of a hoya pentagonal stylar table. Three coronal scales and the underlying anthers have been removed to show the relative position of the pollinarium. Two scales remain, one at the right side and one above. Magnified approximately 45 times.

Coronal Section



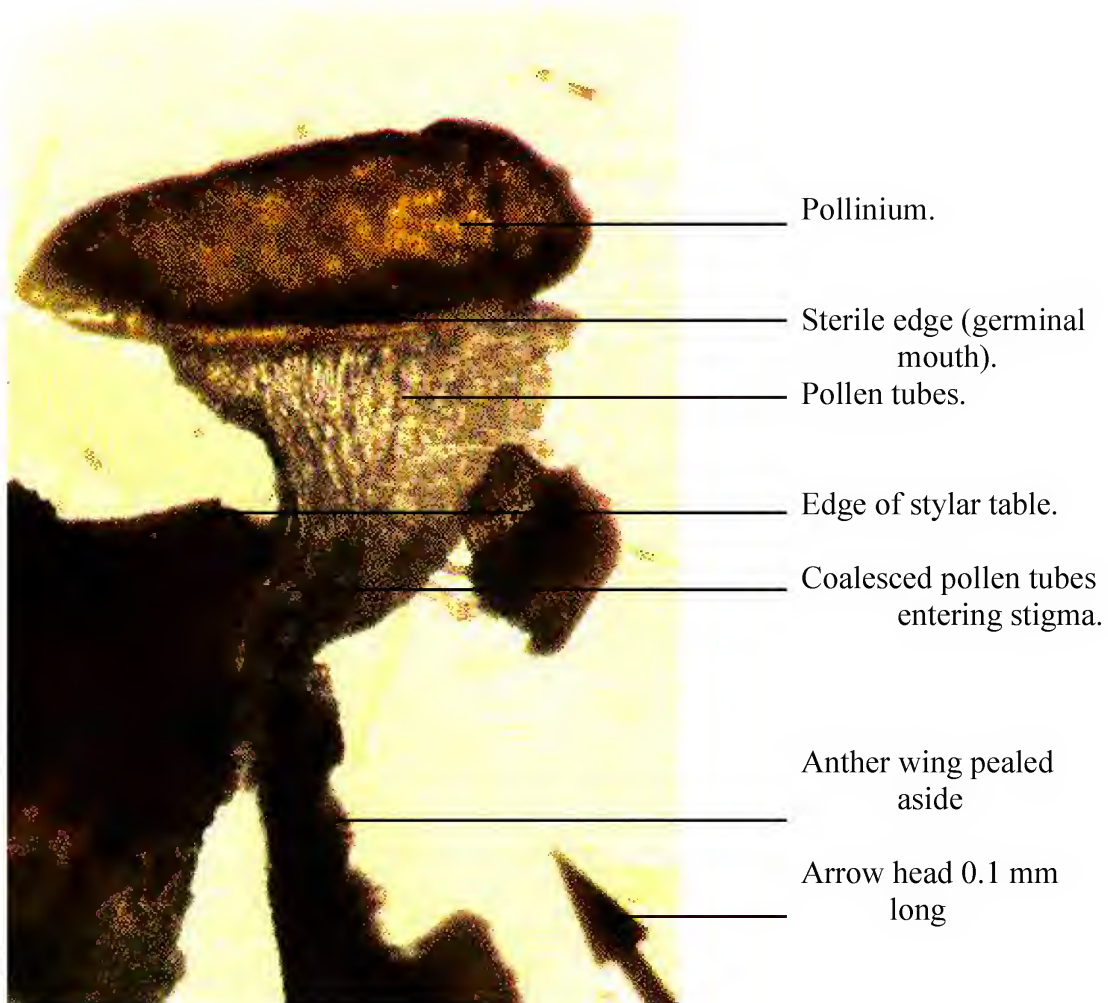
Section between the anther wings of a flower of *Hoya obtusifolia* Wight, magnified approximately 16x. Section stained to bring out structural detail. Showing anther with one empty anther envelope, above which is one intact coronal scale. Below the anther the stylar material has been sectioned cutting through the fused stigma, with the stigma receptive cavity visible at the end of the groove flanked on the right side by one rigid anther wing. Leading from the stigma the channel of spongy material is visible through which pollen tubes would travel if fertilization were to occur. Hollow ovary cavity is visible and labeled above.

The Hoya Pollinarium



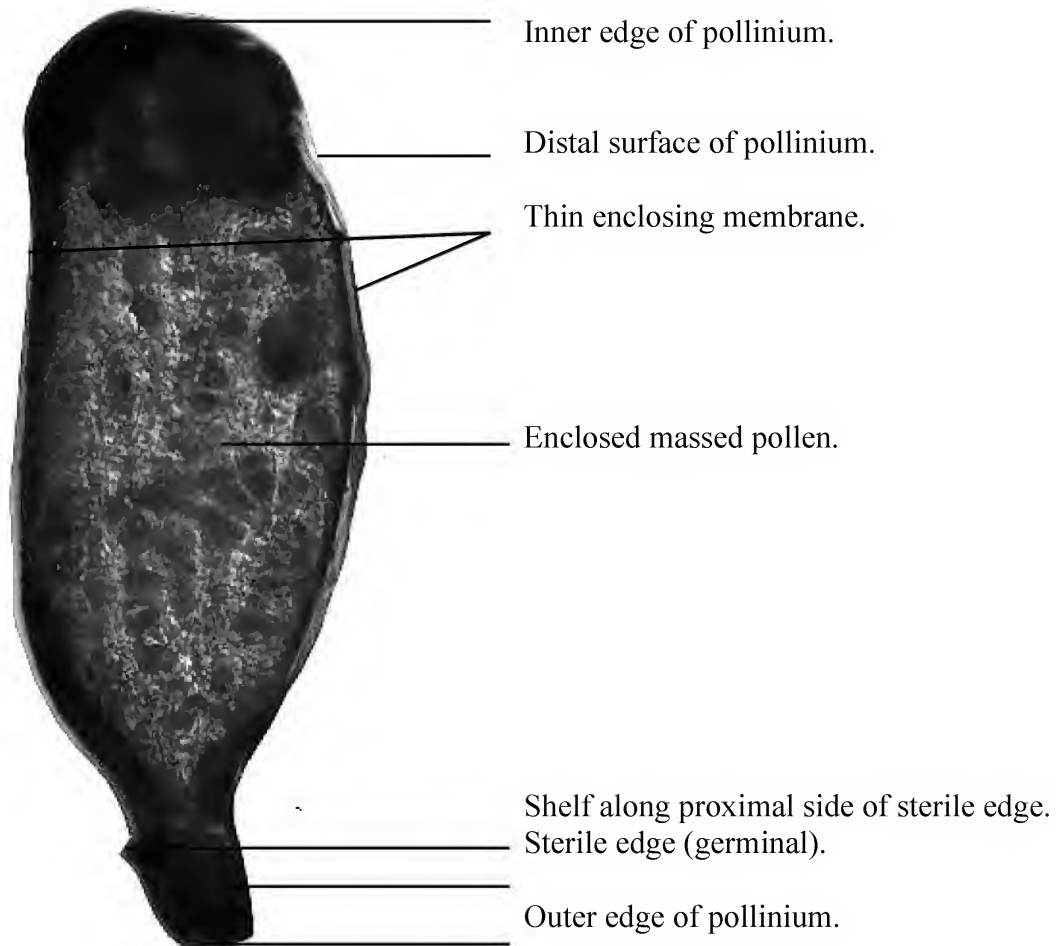
A photo of a hoyo pollinarium magnified approximately 165 times.

Pollinium Germination



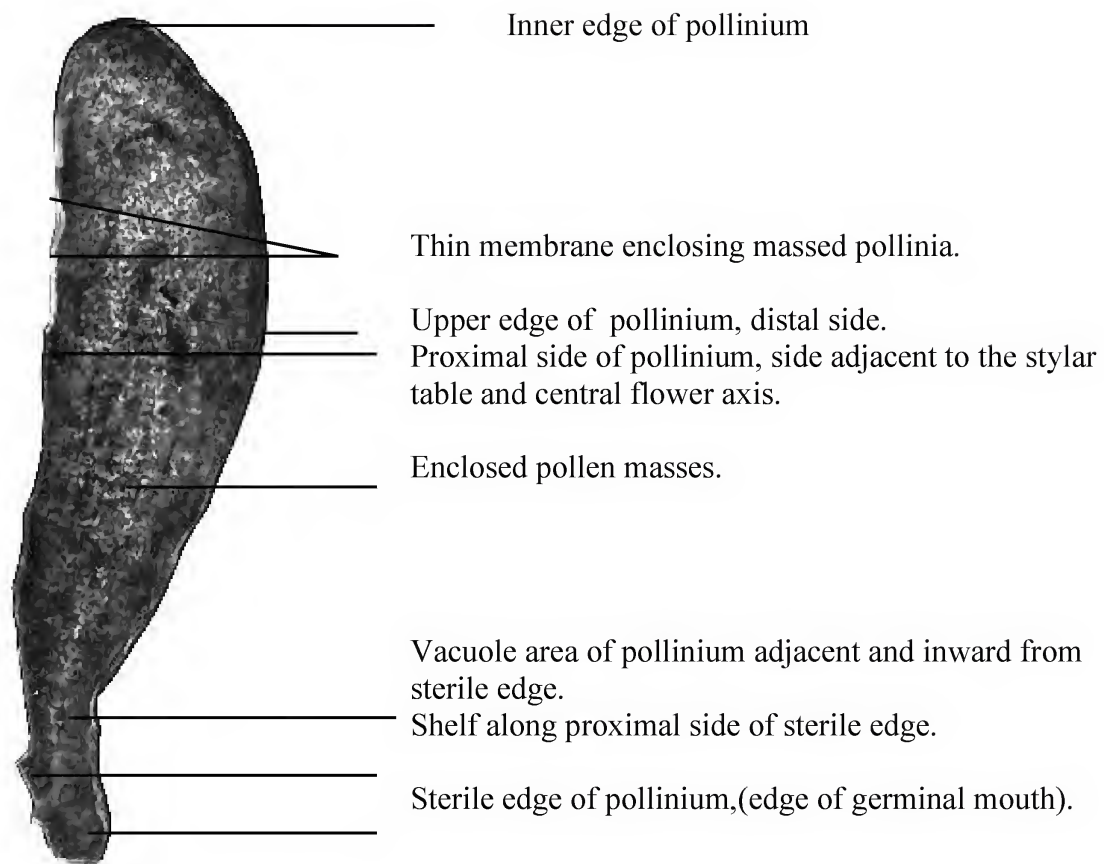
Pollinia magnified approximately 165x showing pollen tubes emerging from sterile pellucid edge (germinal mouth). Tubes coalesce into a tube entering the receptive stigmatic area under where the retinaculum is secreted. Scales and sections removed to photograph this germination.

Cross Sections of Pollinia



Magnified approximately 165x.

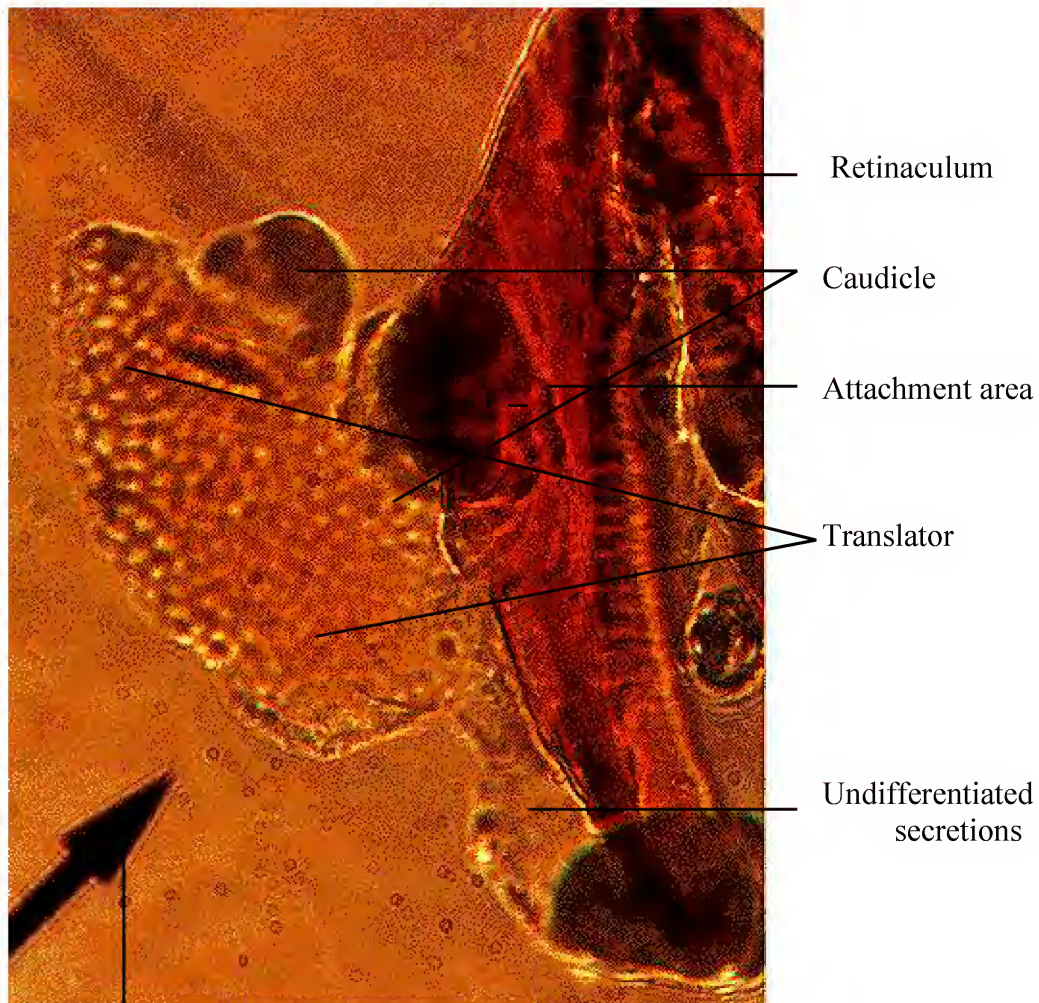
Pollinia from flower of *Hoya obtusifolia* Wight, clone with white corona via CT.
Thailand.



Magnified approximately 165x.

Pollinium from flower of *Hoya imperialis* Lindley, clone via Ted Green from Palawan Island, Philippines. Cross section. Note the difference of the proximal edge of the pellucid edge in this species and the one of *Hoya obtusifolia* shown on page 11.

Translator and Caudicle Development

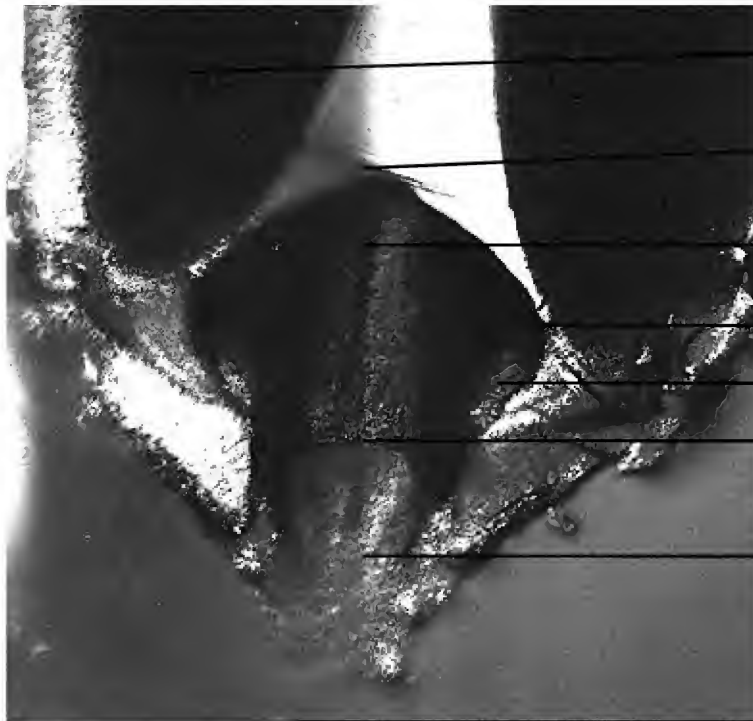


Arrow head is 0.1 mm long.

Magnified over 660x. At this stage of development on the pollinarium the bud of the Hoya flower is covered over 1/2 by the calyx. The translator is more completely developed at this time than is the caudicle, which at this early stage is not yet in contact with the pollinium. The pollinium is still enclosed in the anther envelope. The caudicle and translator are attached inside the retinaculum in a tunnel entering the side at approximately a 45 degree angle extending upward under the broadened shoulder of the retinaculum.

Upper and Lower surfaces of the Retinaculum
from *Hoya imperialis* Lindley, clone from Palawan, Philippines via Ted Green.

Lower Surface View ↓



Pollinia.

Inner apex.

Head area, hollow in central portion.

Shoulder.

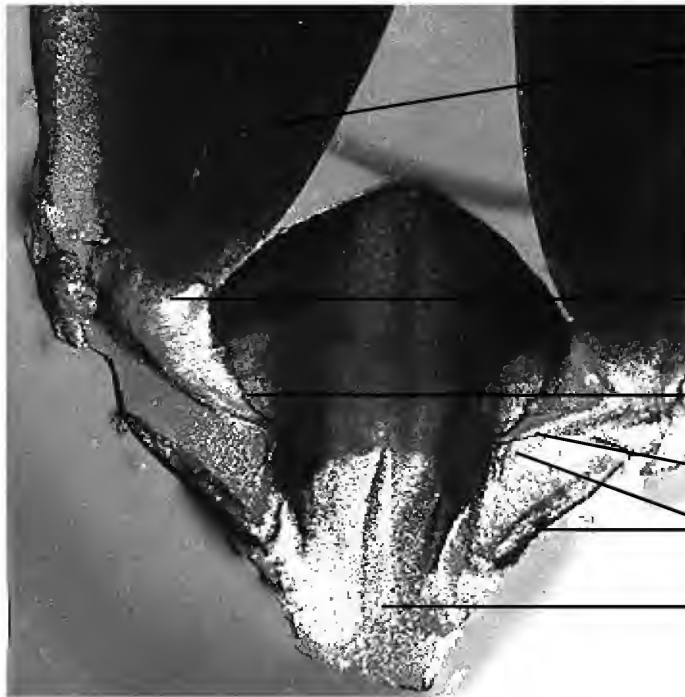
Cavity (tube) entrance.

Extent of outward development of under surface.

Bottom of upper surface.

Magnified approximately 165x.

Upper Surface View ↓



Pollinia.

Caudicle.

Translator and Caudicle entering tube in side of retinaculum.

Caudicle arm.

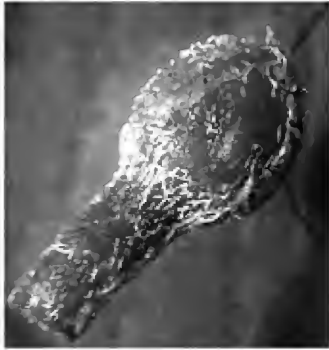
Translator.

Upper surface of retinaculum, outer apical area.

Magnifier approximately 165x.

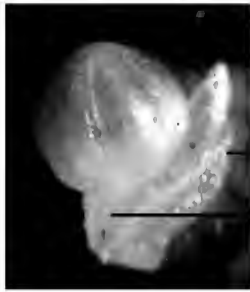
Pollinarium Development Stages

Stage 1: *Hoya kerrii* Craib.



In the very early flower bud stage, prior to any secretion of retinacular structure, the two pollen masses are present in the anther envelopes. At this is time they are not yellow but rather pale cream colored. The anther and stylar table are structurally visible. At this stage no coronal development is visible.

Tight bud stage, 0.34 cm. long x 0.23 cm. widest.



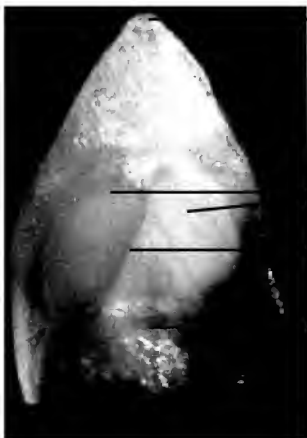
Outer surface of anthers with calyx and corolla peeled back.

Corolla loosened from bud.

Sepal of calyx peeled back from bud.

Pedicel.

Same bud as above approximately 16X magnification.



Anther inner apex, proximal surface.

Pollinia within anther sacks (envelopes)

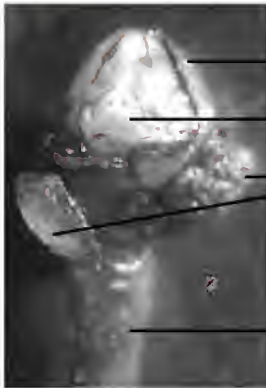
Side where germinal mouth (sterile edge) forms.

Area of attachment to the edge of the stylar table.

Stage 2:



The first visible presence of a retinaculum begins just as the bud begins to swell and the apex of the corolla begins to protrude above the calyx. The upper surface of the retinaculum is secreted first and at this early stage is only present as two thin slivers of darkened tissue connected at the inner end. The translators and caudicle are not present. The pollinia have further enlarged and have become pale yellow in color. In addition the crown has begun to develop (although still colorless).



Corolla.

Crown beginning development on outside of anther.

Calyx cut off and peeled back.

Pedicel.

Anther magnified approximately 16x, with calyx and corolla removed or peeled back. Stained to enhance detail.

Stage 3: Parts shown are from *H. kerrii* Craib.



Bud apex.
Corolla lobes still fused.

Sepal (calyx) apex.

Pedicel.

Bud magnified approximately 35x.
0.38 cm. tall x 0.45 cm. diameter.



Anther apex.

Corolla.

Pollinium.

Apex of inner coronal lobe.

Retinaculum shown in bottom photo.

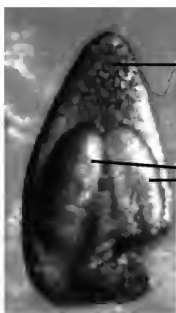
Anther appendage.

Outer coronal lobe just beginning development.

Calyx

Pedicel

Bud as above with sepals and corolla removed and one anther removed exposing pollinium and retinaculum.



Anther (wing) with two pollinia still enclosed in envelopes (sacks).

Pollinium (two).

Measurements: base 0.09 cm; height 0.13 cm.



By the time the bud swells to where the calyx reaches approximately half way to the bud apex the retinaculum appears as shown in this photomicrograph magnified approximately 160x. Here the translators are developing but not fully formed. The caudicle is just starting to develop (the bulbous end that eventually envelopes the lower end of the pollinia). In addition the retinacular lower surface has not been fully secreted by the fused stigmas.

Stage 4: At the time the flower is beginning to open the pollinia are released from the anther envelopes and adhere to the gelatinous sticky caudicle. The caudicle in turn is supported by the triangular (wedge shaped) translator arm which lies in the groove where the anther adheres to the edge of the stylar table.

Terminology

Excerpts from Historical Usage's of Terms Pertaining to Hoya Pollinarium

Over time, various terms have been used for the different parts of the male reproductive structures. See my labeled photo page 9 of the parts involved.

The oldest reference I have is Vahl's 1810 use of the term "*corpusculi*" for the secreted central holder. Vahl applied this term in the description of the species *Sperlingia verticillata*, now determined to be *Hoya verticillata* (Vahl) G. Don. I would assume on the basis of priority alone, this term would be the most appropriate to use, however priority does not necessarily apply in such cases. I had preferred and used the term "*retinaculum*", much used by Schlechter, and others. This latter term was also used by Blume in Rumphia IV 1848.

In regard to the pollen which is in coherent masses the designation "*massae pollinis*" was applied in 1811:84 in Anton's Hortus Kewensis and repeated by many subsequent authors (in Latin or English) up to the present time. The secreted connection of the pollen masses and the corpusculum has gone by various names. It was King and Gamble in 1901:559 (Flora of the Malay Penn.) who said "attached by caudicles of various shapes". In reality the pollinia are attached at their base by a sticky, usually clear gelatinous mass, best termed a "*caudicle*". It must be noted this structure may be fused to the underlying structure and barely visible. This structure is supported in many cases by a more rigid wedge shaped structure that I have labeled a translator or translator arm (not originated by me). It is the upper slightly concave surface that supports the caudicle in most cases.

The term **translators** appears in Perkins (Fragmentia Fl. Philipp.) by Schlechter & Warburg. It is repeatedly used in many German descriptions i.e. Wettstein, Schumann & Lauterbach et al.

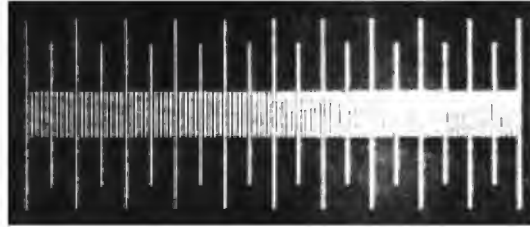
Confusion as to what is referred to by the use of “*pollinia*” for the structure enclosing the pollen but also used for the whole male structure is unfortunate. Forster and Liddle have used the term “*pollinarium*” for the whole structure 1990 in “A checklist for the Genus Hoya R. Br. (Asclepiadaceae) in Papuasiasia”. As far as I can determine this term was used by Lynch 1977 for descriptions in the Genus Asclepias.

The following is an attempt to put into dated sequence the use of the various terms in regards hoyas:

- 1810 “*Germinia duo sub centro corpusculi*” 114 **Vahl**: in Gkrivter af Naturhistorie-Gelskabet.
- 1811 “*Massae Pollinis...*” 84 in **Aiton’s** Hortus Kewensis.
- 1825 “*Massae pollinis*” 1062 **Blume**: in Bijdagen tot de Flora van Nederlandsche Indie.
- 1837 “*pollen masses* fixed by the base,
- 125 and “*pollen masses* erect, fixed by the base to the back of the *corpuscles*” 128 in **G. Don** General Sys. of Gardening and Botany.
- 1844 “*Massae pollinis* erectae, approximatae, ad *corpusculi* dorsum basi affixae” 663 et al, and “*saepius margine pellucidae*” 634 in **Decandolle**, Prodramus Sys, Veg..
- 1848 “*Massae pollinis...*” 310 in Fleur des Serres. VI
- 1848 “*Pollinia* basi affixa” and “*Retinacula minutissima**pollinia* basi affixa” et al 50 and *Retinacula emarginaturis stigmatis.....Pollinia clavata**cornibus retinaculi* affixa.” 51 **Blume**: in Rumphia IV.
- 1852 “*Pollinia* basi affixa.....” 64 **Walpers**: in Annales Botanices Systematicae.
- 1865 “*Massae pollinis ...*” 159 **Muller**: in Fragmenta Phytographiae.
- 1883 “*pollen- masses* 2 to each anther,..” 319 **Bailey**: in Synopsis of the Queensland Flora.
- 1883 “*pollen-masses* various
- 52 **Hooker**: in Flora of British India.
- 1895 “*pollen masses ...*” 162 **Trimen**: in Handbook of the Flora of Ceylon.
- 1901 “*pollen-masses* 1 in each anther call, erect, waxy, usually flattened, often thickened on the outer margin, attached by *caudicles* of various shapes,
- to the horny hard *pollen carriers*.” 559 et al **King & Gamble**: in Jour. of the Royal Asiatic Soc., Bengal Branch. A lot of attention has been given in their species descriptions to variations in the *caudicles* e.g. conical “pollen carriers” and “cup-like caudicles.”
- 1902 “*pollen masses* waxy” 320 **Collett & Hemsley** in Flora Simlensis.
- 1903 “*Pollinia* basi affixa
- 478 et all in Plantae Hochrutinernae.
- 1904 “*polliniis* compressis oblique oblongis, *translatoribus* prebrevibus diatis, *retinaculo ...*” 131 et al and “*caudicululis ...*” 133 **Schlechter & Warburg**: in Fragmentia Florae Philippines.

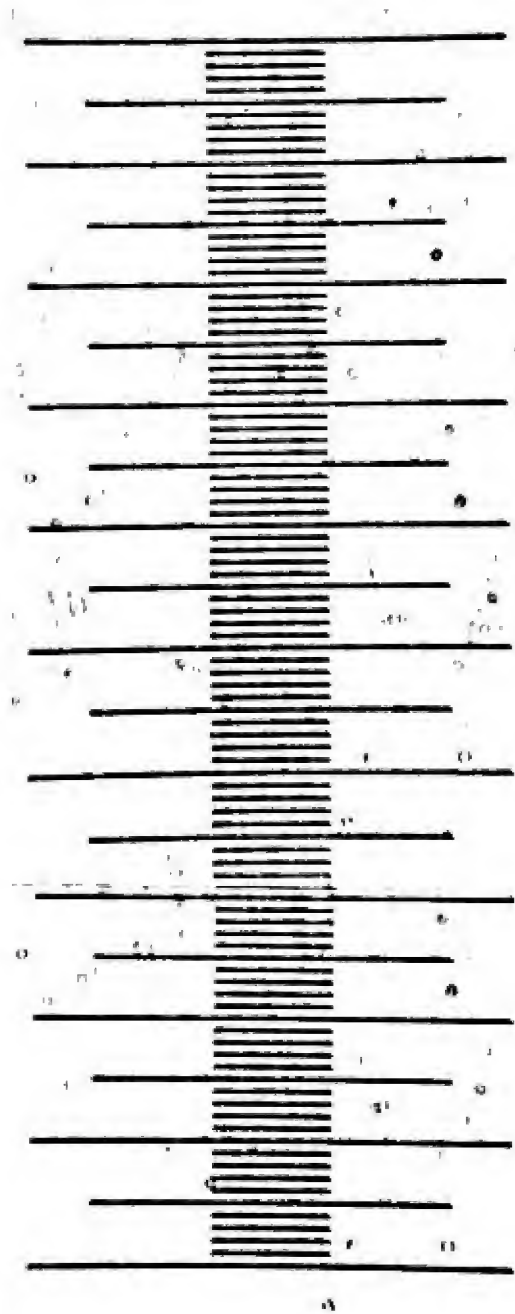
- 1905 “*polliniis oblique oblongis, translatoribus brevibus, retinaculo rhomboideo....*” 362 et al **Schumann & Lauterbach**: in Nachtrage Zur Flora der Deutschen Schutzgebieten.
- 1911 “*Pollinien. Translatoren mit klemmkorpern.*” 450 **Wettstein**: in Handbook Sys. Botanik.
- 1912 “*masses polliniques oblongues, attachees par des caudicules en coupe a un retinacule ...*” 9 et al **LeConte**: in Flore Gen. De L Indo-chine.
- 1912 “*pollen-masses 1 in each cell.*” 380 **Merrill**: in A Flora of Manila.
- 1920 “*polliniums solitary..*” **Fyson**: in Flora of the Nilgiri & Pulney Hill Tops.
- 1922 “*Pollinia 1 in each cell,*” 561 **Haines**: in Botany of Bihar & Orissa.
- 1923 “*pollen in waxy masses*” 208 **Parkinson**: in A Flora of the Andaman Islands.
- 1923 “*pollen masses erectattached by distince caudicles to the horny pollen carriers*” 848 **Gamble**: in Flora of the Presidency of Madras.
- 1923 “*Pollinia single, waxy with short thick caudicles.*” 394 **Ridley**: in Flora of The Malay Penn.
- 1956 “*pollen masses.... corpuscula cornea ...*” 462 **Henry**: in Journal Bombay Natural History Society 75.
- 1960 “*Pollinia erect from dark horny corpuscula....*” **Pham-Huong**: Flora du Vietnam.
- 1965 “*pollinia solitary ...*” 751 **Ohwi**: in Flora of Japan.
- 1965 “*pollinium solitary in each anther cell, erect, often pellucid-margined on one side*” 266 **Backer** in Flora of Java.
- 1973 “*pollen -masses....*” 50 in **Huber**: A Revised Handbook of the Flora of Ceylon.
- 1974 “*polliniis in quoque loculo solitariis..... caudiculis erectis brevissimis, retinaculo oblongo,.....*” 126 **Tsang & Li**: in Acta Phytotaxinomica 12 #1.
- 1976 “*Pollinia erect from dark horny corpuscula, 2 anther, waxy without pellucid margins.*” 449 **Saldanha & Nicholson**: in Flora of Hassan Dist. Karanataka India.
- 1978 “*Twin-Pollinia*” “both *pollinia* and *caudicles* are winged with *caudicle* wings being very broad” 475 and “*pollen masses known as pollinia: by secretions of the stigma which produce the caudicle and corpuscule*” **Rintz**: in Malay Nature Journal.
- 1984 “*pollinia marginem pellucida...., caudiculis brevibus..., retinacula elliptico...*” 119 **Li**: in Bull. of Botanical Research IV.
- 1990 “large *pollinarium*: 5 **Forster & Liddle**: A Checklist for the Genus *Hoya* R. Br. (Asclepiadaceae) in Papuasias.
- 1992 “*pollen in pollinia.*” 596 in Royal Hort. Soc. Dictionary of Gardening 2.
- 1992 “*Pollinarium 1.3-1.4 mm long , 1.2-1.3 mm wide; pollinia oblong, 1.12-1.15 mm long, 0.35-0.42 mm wide, with pellucid germination mouth on outer edge; corpusculum ovate, 0.8-0.9 mm long, 0.55-0.58 mm wide; caudicles 0.30-0.35 mm long,*” 629 et al **Forster & Liddle**: in Austrobaileya 3(4): 627-641.

Measuring Gauge
100 micron (1 mm) scale imbedded in slide.



Magnified 65 times.

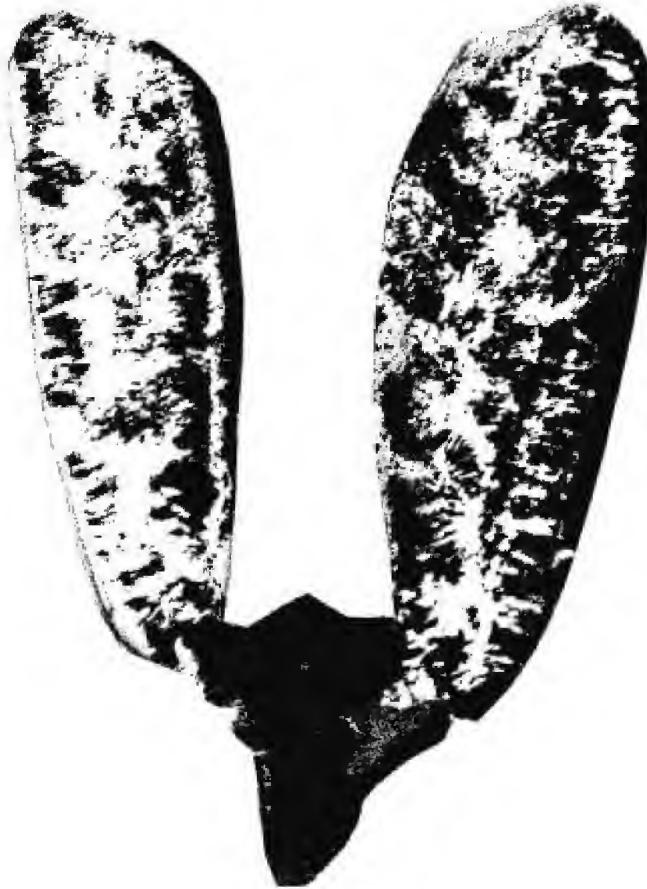
The above type magnified scale, and the one on the following page, were used in measuring the pollinaria features in this study. The scale is one millimeter long, divided into 100 segments, on a microscope slide covered with a cover slip. Measurements can be made direct at the time of viewing, or of the enlarged photos.



One millimeter scale magnified 165 times.

Hoya kerrii Craib 1911
The five pollinarium from one flower.

#	Length			(Pollinium)		Width	
	<u>Right</u>	<u>Left</u>	<u>Difference</u>	<u>Right</u>	<u>Left</u>	<u>Difference</u>	
1	0.57 mm	0.57 mm	0.00 mm	0.19 mm	0.19 mm	0.00 mm	
2	0.58 mm	0.59 mm	0.01 mm	0.19 mm	0.19 mm	0.00 mm	
3	0.56 mm	0.56 mm	0.00 mm	0.19 mm	0.19 mm	0.00 mm	
4	0.57 mm	0.59 mm	0.02 mm	0.19 mm	0.19 mm	0.00 mm	
5	0.59 mm	0.55 mm	0.04 mm	0.20 mm	0.16 mm	0.04 mm	



All pollinium here magnified approximately 160x. Above is pollinium #5. On the following page arranger left to right top to bottom is #1, #2, #3 and #4. There is as to be expected some slight differences in development of the various parts giving rise to different measurements. In addition differences in focal depth and positioning of parts after removal from the flower also may contribute to some differences.



Comparison of Pollinaria
Hoya merrillii Schltr., flowering's of five (5) different years at Fresno, Calif..



1990 flowering.



1991 flowering

approximately 165x.

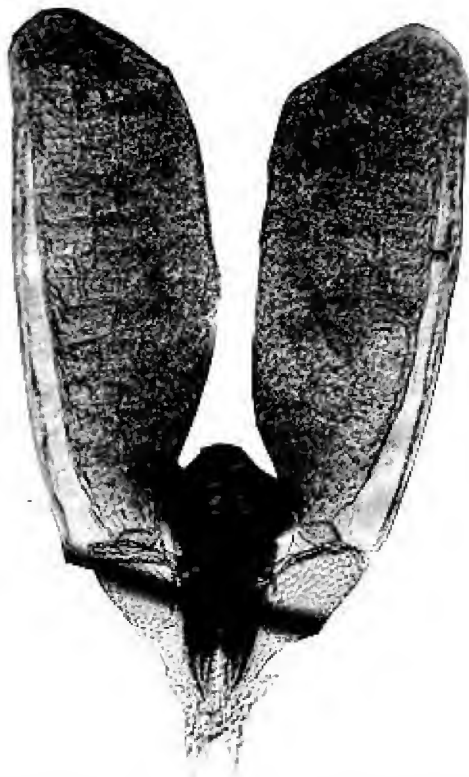
Pollinaria magnified



1992 flowering.

1993 flowering

Pollinaria magnified approximately 165x.

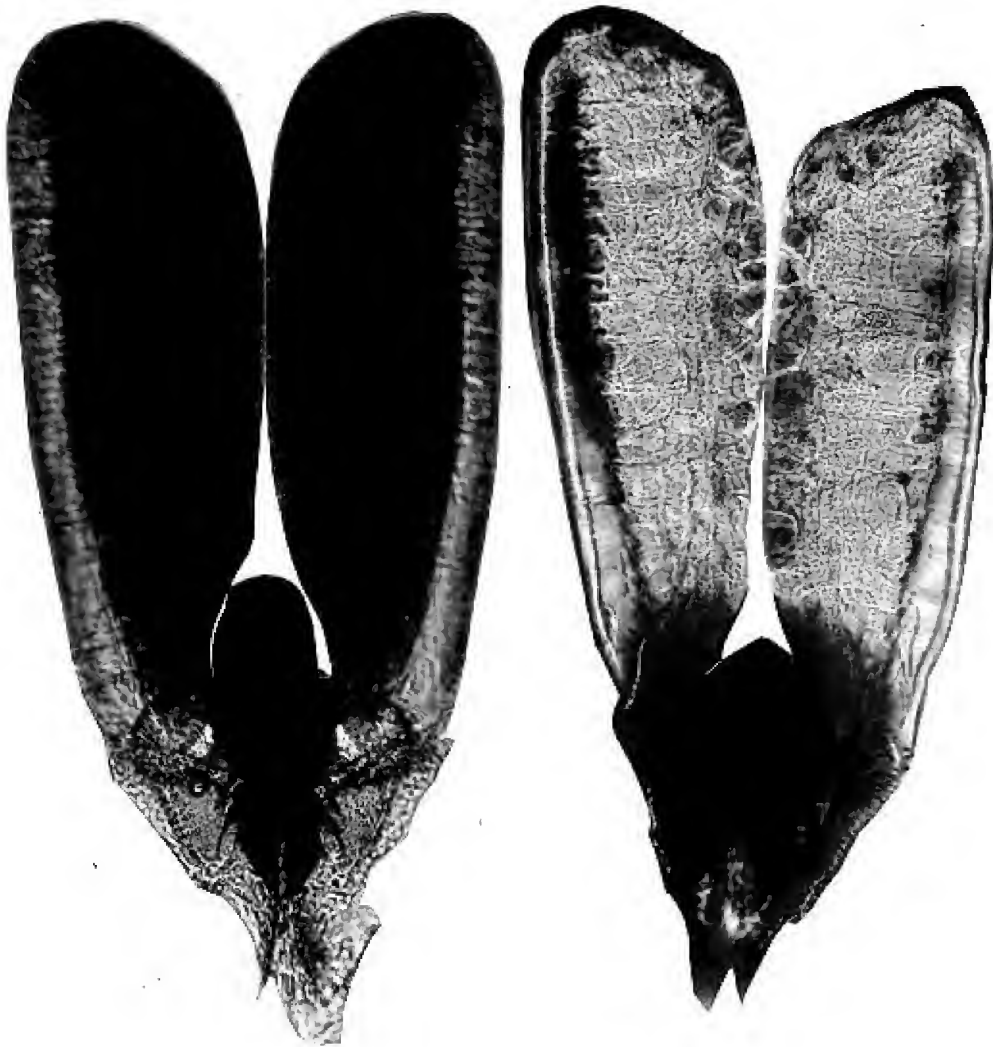


1994 flowering.

Pollinarium magnified approximately 165x.

There appears to be slight variations in the pollinarium of one clone flowered in different years. Some variation in photos results from the focal plane selected. The thickest structure, the retinaculum, gives the most difficulty since the head may rise above the plane of the pollinia. This difference gives rise to photos that appear different but are actually views of different depths on the same object. I was surprised at minimal variation when the results of this study was completed and assembled. There is always variation in the amount of undifferentiated material clinging to the outer apical area of the retinaculum and sometimes along the translators.

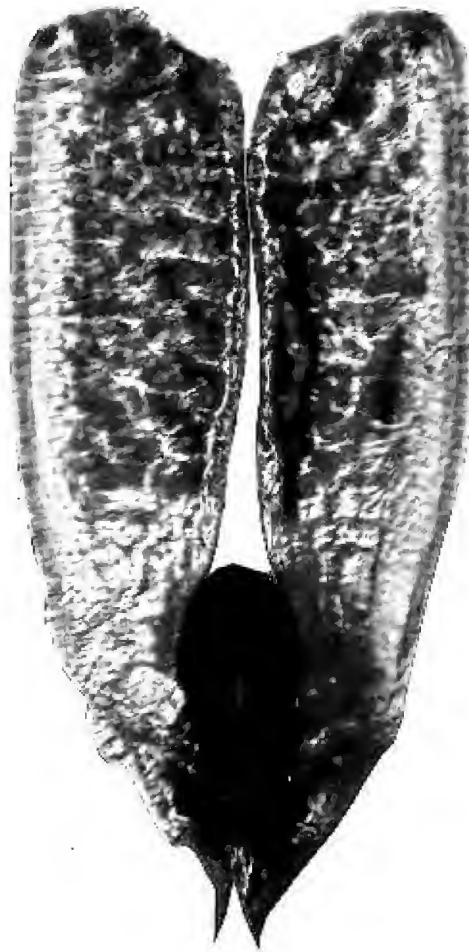
Comparison of Pollinaria
Hoya sp. 80-03, flowered at three (3) different locations.



Flowered at Kaaawa, Hawaii

Flowered at Fresno, Calif..

Pollinaria magnified approximately 165x.



Flowered in Central Point, Oregon.

Magnified approximately 165x.

The pollinia flowered at different locations show slight variation, but are recognizable as from the same species. The pollinia on the right (Fresno flowering) appears shorter but is the result of being skewed toward the outer apex slightly. As with flowerings of different years most variation shown here is the result of focal plane choice. It actually takes a number of photos to determine precisely the variations involved.

Pollinaria Deliniations for 2017

The following photos will help explain the different classifications listed in the 2017 deliniations of pollinaria in the genus HOYA, I have tried to include all the ones I have worked on incluring many still unpublished mostry because of not being able to get holotype sheets made.

Pollinia inner apex types Numbers as in Philippine Key



224) Pollinia inner apex truncate. "S"



225) Pollinia inner apex rounded "R"



226) Pollinia inner apex tapered centrally (inward) "T"



227) pollinia inner ends tapering inward with flat surfaces "F"



228) Pollinia inner apices of two types one rounded “**R**” and one tapered “**T**”



229) pollinia external base expanded outward. “**FL**”

Pollinia Translator Types & Pollinia Caudicle Type

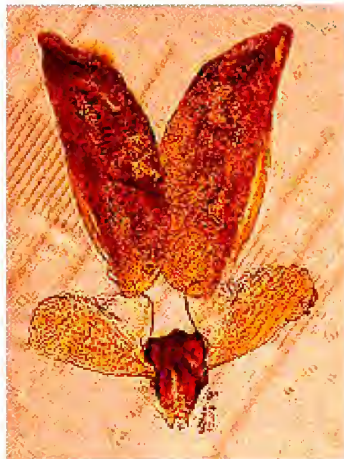


178) Translator type (**ls**).



179) Translator linear but modified a little beyond pollinia end. **l/cw or l/o**

Note: there are other structural differences especially of the retinacula that need to be delineated.



180) Translators fiddle shaped more like drumsticks.
(fb)

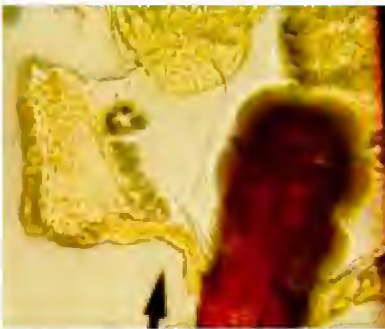
230) Caudicles clear **(C)**



181) Translators perpendicular to the retinaculum.
(p)



182) Translators delta shaped with flat top.
(d)



183). Translators end squared off.
(t)



184). Caudicle a small ball.
(o)



185) Caudicle with wide end funnel shaped.
(cw)

230) Caudicles with clear surfaces.



231) Caudicle surface granulate etc. not clear **(G)**



232) Translators with spreading base, expansive.**(f)**



233) Caudicles rectangular with some dorsal modifications/
otherwise. **(r)**

Pollinaria Retinacula Type



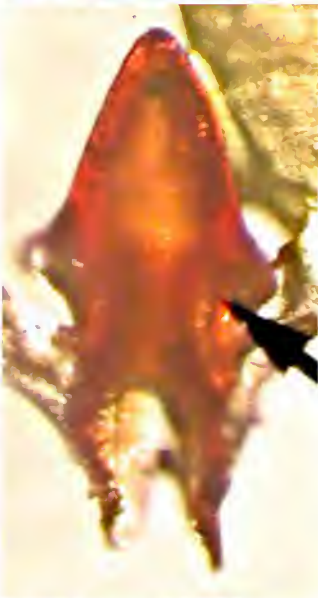
236) Retinaculum elongate, long & narrow. **E**



237) Retinaculum shield shaped
(head, shoulders, waist, hip & legs). **S**



238) Retinaculum shield shaped, head dome shaped.
Shoulders round . **R**



239) Retinaculum shield shaped, head elongated. **HE**



Retinacula with long shoulders **LS**



242) Retinaculum round legs hidden. **LH**



243) Retinaculum round legs showing. **LN**



244) Retinaculum with shoulder ends up (hands up). **HU**



246) retinacula with horns on the head. **HH**

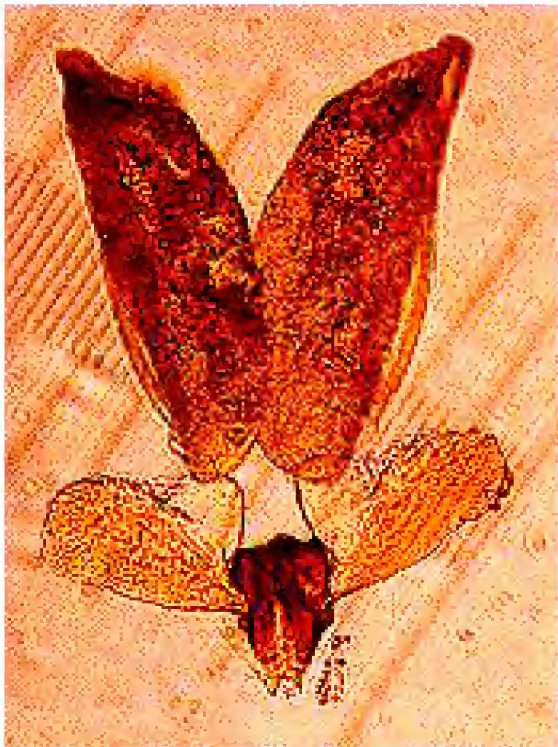


Two Shoulders **2S**



Retinacula with hips broader than the shoulders. **HB**

Translator type (**ls**) the most common type they are short linear, not extending beyond the lower pollinia ends.



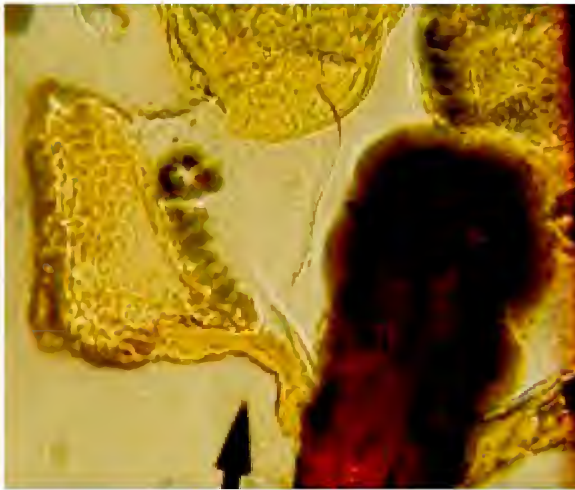
Translators (**fb**) fiddle shaped beyond the lower pollinia ends.



Translators perpendicular from the Retinaculum (**p**)



Translators delta shaped (**d**) top supporting the caudicle flat.



Translators with outer end squared off (t) truncate.



Translators with wide expansive base. (f)

Presentation Follows of Translator. caudicle types:

1.	2017 -1 a.b.c.	ls/o	247 entries
2.	2017-2 a,b.	fb.cw fb/o l/cw	129 entries
3.	2017 -3	p/o	55 entries
4.	2017 -4 a.b	d/o	147 entries
5.	2017 -5	t/o	11 entries
6.	2017 - 6	ls/cw lb/cw	11 entries
7.	2017 - 7	ls/r	34 entries
8.	2017 - 8	cupped	1 entry

Appendix

Species Arranged by Pollinia Length

Column:

1. name
2. pollinia length
3. pollinia width
4. retinaculum length
5. retinaculum width
6. ratio retinaculum length / pollinia length
7. translator/caudicle type
8. pollinia inner end type
9. caudicle surface clear C or granular G
10. retinacula type

Species	#2	#3	#4	#5	#6	#7	#8	#9	#10
archboldiana	1.72	0.64	0.26	0.30	0	l	R	G	S
macgillivrayi	1.35	0.43	0.60	0.40	2.3	ls/o	R	C	HE
multiflora	1.27	0.28	0.20	0.18	6.2	ls/o	R		R
albiflora	1.22	0.45	0.61	0.50	2.0	ls/o	R	G	S
onychoides	1.14	0.40	0.35	0.30	3.3	ls/o	R	C	R
imbricata ssp. megapollinia	1.09	0.16	0.36	0.10	3.1	fb/cw	R		E
elliptica	1.07	0.34				l/cw	R	G	E
coriacea	1.08	0.30	0.59		1.8	l/cw	R	G	E
lobii	1.06	0.40	0.50	0.47	2.1	ls/o	T	G	S
amrita	1.05	0.28	0.35	0.22	3.0	ls/o	R	C	HE
imperialis	1.02	0.30	0.29	0.32	2.0	ls/o	R	C	S
coriacea ssp. philippinensis	1.00	0.26	0.40	0.10	2.5	ls/o	R	G	E
pubic. ssp. glabrapedicila	1.00	0.25	0.35	0.20	2.9	ls/o	T		HE
pruinosa/curt.	0.97	0.28	0.09	0.09	10.8	p/cw	R	C	HE
apoensis ssp sagittaria	0.95	0.23	0.40	0.15	2.4	fb/cw	R	G	E
odorata JP Batangas TG	0.95	0.35	0.40	0.30	2.4	ls/o	R	C	S
chunii	0.95	0.40	0.35	0.18	2.7	ls/o	T	G	S
obtusifolia CT Thailand	0.95	0.30	0.30	0.16	3.2	p/o	R	G	HE
stoneana	0.95	0.30	0.40	0.19	2.4	ls/o	RT	G	HE
imb. basisub Maximo Wyatt	0.93	0.25	0.22	0.18	4.2	fb/cw	RT		E
imbric. Sulawesi 93961	0.93	0.16	0.13	0.07	4.2	t/o	R	G	R
darwinii	0.92	0.42	0.57	0.50	1.6	ls/o ?	R		R
lazaroi	0.92	0.37	0.45	0.38	2.0	ls/o	R	G	S
skinneriana	0.92	0.26	0.40	0.14	2.3	ls/o	RT	G	R
odorata UC 18041	0.92	0.32	0.44	0.17	2.0	p/o	R	G	E

mitrata	0.90	0.32	0.45	0.49	2.0	p/o	R		R
cf. coriacea Toba TG	0.90	0.34	0.31	0.15	2.9	l/cw	RT	G	E
sp. salweenica	0.90	0.26	0.48	0.19	1.9	ls/o	R	C	R
halconensis NS05-213	0.89	0.26	0.34	0.14	2.6	ls/o	RT	C	HE
meliflua	0.89	0.27	0.34	0.22	2.6	ls/o	T		S
halconensis NS05-225	0.88	0.25	0.30	0.14	2.9	l/cw	T	G	R
celeta	0.87	0.25	0.33	0.20	2.6	ls/o	RT		R
darwinii ssp. mabilogensis	0.87	0.40	0.62	0.54	1.4	l/cw	R	G	R
mindorensis ssp. ehirsuta	0.87	0.28	0.23	0.27	3.8	ls/r	R	G	HH/LS
meliflua subsp. fraterna	0.87	0.27	0.37	0.19	2.4	ls/o	T		S
odorata TG	0.87	0.32	0.45	0.27	1.9	ls/o	R	C	R
megalaster	0.87	0.32	0.35	0.30	2.5	ls/o	R	C	S
loyceandrewsiae	0.85	0.27	0.32	0.20	2.7	ls/o	RT		R
irisae	0.85	0.35	0.91	0.09	0.9	ls/o	R	C	HE
buotii	0.85	0.30	0.27	0.15	3.1	l/cw	R		R
meliflua ssp. neuvaensis	0.84	0.24	0.23	0.22	1.7	p/o	T		S
pubicorolla ssp. anthracina	0.83	0.20	0.20	0.20	4.2	d/o	R	G	S
desvoeuxensis	0.83	0.14	0.16	0.09	5.2	ls/o	T	G	?
PNH 9385	0.82	0.27	0.24	0.14	3.4	ls/o	R		
pubicorolla	0.81	0.23	0.27	0.22	3.0	ls/o	T	C	S
australis subsp. aust.	0.81	0.35	0.44	0.22	1.8	ls/o	R	C	HE
NS 05 231	0.81	0.24	0.38	0.30		l/cw	R	C	HE
sp. MT 13	0.81	0.24					RT	G	E
meliflua ssp. darastanensis	0.80	0.25	0.21	0.26	3.8	p/o	R	G	S
meliflua ssp. mendozae	0.80	0.25	0.25	0.18	3.2	ls/o	RT	G	R
sp. CI #3	0.80	0.23	0.16	0.12		ls/o	R		S
davaoensis	0.80	0.25	0.20	0.15	4.0	d/o	R	G	S
thompsonii CT Thailand	0.80	0.25	0.29	0.18	2.8	ls/o	F	C	HE
UC 49238	0.80	0.32	0.38	0.20		ls/o	RT		R?
excavata	0.79	0.27	0.27	0.18		ls/o	R	G	S
fraterna	0.79	0.23	0.35	0.14		l/cw	R	G	HE
sabaensis	0.78	0.25	0.14	0.13	5.6	p/o	R	G	S
279 ex India	0.77	0.24	0.27	0.15	2.9	ls/o	T		S
BSI #1	0.77	0.20	0.33	0.19	2.3	ls/o	R	C	R
PNH 13306	0.77	0.25				/o	R	C	
linavergarae	0.77	0.32	0.25	0.12	3.1	l/cw	R	G	HE
bella	0.77	0.22	0.28	0.08	2.8	fb/cw	T	G	E
weebella	0.77	0.25	0.25		3.1	fb/cw	R	G	E
meliflua ssp. escobinae	0.77	0.39	0.32	0.37	2.4	ls/o	R		S
sp. MT 13	0.76	0.27	0.30	0.12	2.5	l/cw	RT	G	E
sp. Thailand C.T.	0.76	0.23	0.20	0.15	3.8	ls/o	RT	C	S
as apiculata not	0.75	0.32	0.23	0.19	3.3	ls/o	R	C	S
carnosa white	0.75	0.22	0.28	0.16	2.7	ls/o	RT	C	S
fuscomarginata	0.75	0.17	0.17	0.10	4.4	d/o	RT	G	HE
odorata ssp. antoinseneis	0.75	0.18	0.25		3.0		T		
paziae	0.75	0.25	0.30	0.22		ls/o	R	C	R

pachyclada	0.75	0.28	0.35	0.15	2.1	d/o	R	G	HE
carnosa D 124	0.75	0.22	0.28	0.16	2.7	ls/o	RT	C	S
as finlaysonii	0.75	0.26	0.27	0.18	2.8	d/o	T	G	HE
densifolia as cumingiana	0.75	0.30	0.15	0.10	5.0	ls/o	RT		R
corollamarginata	0.75	0.22	0.30	0.19		ls/o	T		S
georgemendozai	0.75	0.32	0.52	0.40	1.4	p/o	R		R
pseudorigida	0.75	0.25	0.25	0.19	3.0	d/o	RF	C	HE
aust. rupicola	0.74	0.28	0.33	0.21	2.2	ls/o	T	C	HE
subquintuplinervis	0.74	0.22	0.20	0.17	3.7	ls/o	R	G	S
fungii	0.74	0.19	0.25	0.16	3.0	ls/o	R	C	R
greenii	0.74	0.25	0.25	0.15	3.0	ls/o	R	C	S
acicularis	0.74	0.19	0.15	0.05	4.9	fb/cw	RT	C	E
australis subsp. oramicola	0.73	0.27	0.27	0.18	2.7	ls/o	T	G	HE
odorata UC 29638 Polillo	0.73	0.25	0.38	0.15	1.9	p/o	R	G	S
hernaezii	0.73	0.24	0.29	0.16	2.5	ls/o	T	C	S
patameaensis	0.73	0.24	0.27	0.18	2.7	p/o	T	G	S
purpureofusca	0.73	0.25	0.30	0.17	2.4	p/o	RT	C	S
Avila Ridge betchei	0.72	0.24	0.26	0.12	2.8	ld/o	RT	C	S ?
cinnamomifolia	0.72	0.27	0.30	0.20	2.4	d/o	RT	G	HE
aust. ssp. nathalieae	0.72	0.28	0.40	0.23	1.8	ls/o	RT	C	HE
darwinii ssp. minora	0.72	0.43	0.77	0.65	0.9	l/cw	R	G	R
odorata UC 14549	0.72	0.30	0.33	0.25	2.2	ls/o	RT	C	R
pubicenta	0.72	0.20	0.22	0.20	3.3	ls/o	T	G	HE
pubicorolla	0.72	0.23	0.27	0.22	2.7	ls/o	T	C	S ?
tamdaoensis	0.72	0.26	0.28	0.16	2.6	p/o	R	C	S
vitiensis TG	0.72	0.27	0.25	0.17	2.9	ls/o	R	G	HU
sp. India #3	0.72	0.20	0.20	0.15	3.9	ls/o	RT	G	R
serpens	0.72	0.27	0.22	0.15	3.3	ls/o	RT		S
leucorhoda	0.71	0.25	0.30	0.17	2.4	p/o	R	G	R
paulshirleyi	0.71	0.20	0.18	0.12	3.9	d/o	RT	C	HE
sp. palmate Fresno 2006	0.71	0.20	0.16	0.12	4.4	ls/o	R		HE
chlorantha var. tutuilensis	0.71	0.30	0.27	0.10	2.6	ls/o	T	G	E
nicholsoniae IML 39	0.70	0.30	0.23	0.17	3.0	ls/o	T	C	S
sp. UPLB 50 TN	0.70	0.26	0.29	0.11	2.4	l/cw	R	G	HE
taytayensis	0.70	0.23	0.21	0.15	3.3		R		R
sp. CI #3	0.70	0.14	0.14	0.06	5.0	ls/o	R	C	S
naumanii	0.70	0.29	0.30	0.22	2.3	ls/o	RT		S
sp. Balasik TG 94112	0.70	0.24	0.20	0.18	3.5	ls/o	R	G	S
santiago ssp. mandozai	0.70	0.22	0.37		1.9	ls/o	R		
betchei W 3245	0.70	0.29	0.26	0.18	2.7	ls/o	T	G	S
sp. Bangkok 4	0.69	0.21	0.20	0.12	3.5	ls/o	T	C	S
dolichosparte	0.69	0.27	0.24	0.11	2.9	ls/o	R	C	S
gildingii	0.69	0.22	0.34	0.12	2.0	ls/o	T	G	S
cumingiana Fresno	0.69	0.27	0.25	0.15	2.8	ls/o	T		R
PNH 806	0.68	0.30	0.45	0.25	1.5	ls/o	R	G	S
imbricata green leaf	0.68	0.23	0.25	0.16	2.7	l/cw	T		LS

mindorensis ssp. deptensis	0.68	0.30	0.40	0.44	1.7	l/r	R	G	LN
acuta Haworth 1821	0.68	0.24	0.29	0.11	2.3	ls/o	T		HE
vitiensis	0.68	0.27	0.27	0.16	2.5	ls/o	RT		HE
UC 13860 odorata	0.68	0.20	0.34	0.18	2.0	ls/o	T		HE
dischorensis not ischnopus	0.68	0.26	0.17	0.10	4.0	ls/o	R	C	S
acuta CT	0.67	0.23	0.22	0.16	3.0	ls/o	R	C	HE
UC 20732 cf. vitiensis	0.67	0.28	0.25	0.13	2.7	ls/o	R		S
golamcoiana	0.67	0.26	0.20	0.15	3.4	ls/o	T	G	R
chlorantha W 10477	0.67	0.23	0.17	0.20	3.9	ls/o	T		S
imbricata ssp. lagunaensis	0.67	0.20	0.25	0.10	2.7	d/cw	R	G	E
kloppenburgii	0.66	0.23	0.25		2.6	fb/cw	R	G	E
chlorantha	0.66	0.28	0.20	0.19	3.3	ls/o	T		S
chlorantha W 3111	0.66	0.28	0.20	0.19	2.4	ls/o	T		S
minibella	0.66	0.24	0.32	0.18	2.1	d/o	RT	G	S
W 6582 not vitiensis	0.65	0.25	0.24	0.18		d/o		G	T
savaiiensis ssp.	0.65	0.22	0.25	0.18		ls/o	S		S
falealupoensis W 8231									
W 3110	0.65	0.23	0.21	0.18	3.1	ls/o	RT	G	HU
acuta green flower	0.65	0.21	0.25	0.15	2.6	d/o	T	G	E
acuta new TG	0.65	0.23	0.22	0.11	3.0	p/o	T	G	E
fetuana	0.65	0.23	0.25	0.18	2.6	ls/o	R	G	S
seanwhistleriana	0.65	0.24	0.23	0.19	2.8	ls/o	R	C	S
rigida	0.65	0.24	0.22	0.12			T		S
sp. Sulawesi med. flower	0.65	0.27	0.23	0.16	2.8	ls/o	R		S
odorata ssp. taytayensis	0.65	0.24	0.34		1.9		R		
rigida CT Thailand	0.65	0.24	0.22	0.12	3.0	p/o	T	G	S
sp. shephardell	0.65	0.21	0.24	0.15	2.7	d/o	RT		S
80-03	0.65	0.21	0.14	0.14	4.6	d/o	R	G	R
sp. PNH 1268	0.65	0.21							
sp. fetuana W 8717	0.65	0.21	0.22	0.15	3.0	ls/o	R	G	HU
campanulata	0.64	0.21	0.30	0.10	2.1	fb/cw	RT	G	HE
shephardii Short ex Hooker	0.64	0.23	0.24	0.10	3.8	ls/o	RT		S ?
cumingiana ssp. rezalensis	0.64	0.20	0.17	0.15	3.8	ls/o	T		R
sp. Matafoao Rg. Am. Samoa	0.64	0.23	0.17	0.13	3.8	ls/o	R	C	S
cf. amoeana	0.64	0.23	0.15	0.14	4.2	b/o	R	C	S
USDA 354238	0.64	0.26	0.19	0.14	2.5	d/o	R	G	S
finlaysonii	0.64	0.21	0.21	0.12	3.0	ls/o	R	G	S
sp. laurifolia	0.64	0.19	0.17	0.10	3.8	ls/o	R		S
cumingiana ssp. biloba	0.63	0.17	0.18	0.12	3.5	ls/o	T	C	R
whistlerii	0.63	0.20	0.21	0.14	3.0	ls/o	R	G	S
NS05-162	0.63	0.22	0.21	0.14	3.0	d/o	RT	G	HE
recurvula sub. bokorensis	0.63	0.27	0.15	0.14	4.2	ls/o	R	C	S
meridithii x crassicaulis	0.63	0.23	0.23	0.13	2.7	ls/o	R		S
CAHUP 61913	0.63	0.29	0.55	0.25	1.1	ls/o	R		LN
sp. Sabah, Malaysia	0.63	0.23	0.21	0.15	3.0	ls/o	R		S
caudata	0.62	0.16	0.17	0.07	3.6	fb/cw	T	C	E

odorata UC 13176	0.62	0.21	0.29		2.2	ls/o	R		
PNG #4	0.62	0.22	0.18	0.09	3.4	ls/o	RT	C	S
limonica	0.62	0.19	0.22	0.10	2.8	p/o	T	C	S
obovata	0.62	0.19	0.22	0.16	2.8	ls/o	T	G	HU
diversifolia ssp. chlorina	0.61	0.25	0.17	0.18	3.6	ls/o	T	C	S
subquintuplinervis	0.61	0.22	0.14	0.14	4.4	ls/o	RT		R?
mindorensis ssp. recurvula	0.60	0.30	0.35	0.30	1.7	ls/r	R	G	LN
mindorensis ssp. horizontala	0.60	0.25	0.35	0.30	1.7	ls/r	R	G	LH
ubudensis	0.60	0.21	0.16	0.11	3.8	d/o	R		R?
monetteae	0.60	0.20	0.14	0.14	4.3	ls/o	T		HU
samoensis ssp. savai'iensis	0.60	0.18	0.10	0.07	6.0	ls/o	R	C	HU
samoensis W1506 Upolu	0.60	0.20	0.15	0.14	4.0	ls/o	RT	G	S
mindorensis ssp. crenea	0.60	0.25	0.34	0.25	1.8	ls/o	R	C	LH
cuminging. ssp. flosvirida	0.60	0.18	0.15	0.15	4.0	ls/o	F		R
wibergiae	0.60	0.21	0.23	0.15	2.6	d/o	T	G	R
wibergiae ssp. alba Klopp.	0.60	0.25	0.25	0.10	2.4	p/o	RT		2S
sp. betchei W 344	0.60	0.25	0.29	0.20	2.1	d/o	T	G	HU
andalensis	0.59	0.19	0.12	0.12	4.9		R		HU
kerrii Thai. white	0.59	0.24	0.24	0.17	2.5	ls/o	R		S
mindor. ssp. kanagongensis	0.59	0.30	0.35	0.25	1.7	ls/r	R	C	LH/HH
recurvula Malaysia	0.59	0.25	0.25	0.12	2.4	d/o	RT	G	R
kerrii Marin Cactus Patch	0.58	0.24	0.20	0.16	2.9	ls/o	T		HU
sp. IPPS 7020 vitellinioides?	0.58	0.20	0.25	0.12	2.3	ls/o			HU
ABG #12 NG	0.58	0.22	0.22	0.12	2.6	d/o	RT	G	R
mindor. ssp. altransa	0.57	0.27	0.39	0.25	1.5	ls/r	R	G	LH
mindor. ssp. waymaniana	0.57	0.27	0.34	0.29		ls/r	R	G	LN
bandongii	0.57	0.22	0.31	0.24	1.8	ls/o	R		HE
mindor. ssp. duoa	0.57	0.20	0.20	0.21	2.9	ls/r	R	G	LH
benitotanii	0.57	0.14	0.07	0.06	8.1	fb/cw	T	G	S
sp. Ben Vergara #56	0.57	0.23	0.12	0.10	4.8	ls/o	R		S
juannguoana	0.57	0.16	0.22	0.07	2.6	d/o	T	C	E
estrellaensis	0.57	0.21	0.22	0.11	2.6	p/o	RT	G	E
sp. DAV 819 as cominsii	0.57	0.21	0.23	0.13	2.5	d/o	T	C	S
sp. Mt. Mantavani, Samoa	0.57	0.21	0.20	0.12	2.9	ls/o ?	R		HE
sp. Sulawesi med fl.	0.57	0.23	0.20	0.13		ls/o	R	G	S ?
erythrina	0.57	0.18	0.30	0.08	1.9	d/o	RT	G	E
erythrostemma	0.57	0.23	0.30	0.22	1.9	l/r	R	C	LH
tannaensis	0.57	0.25	0.17	0.17	3.4	ls/o	T	C	R
gretherii	0.57	0.25	0.20	0.12	2.9	ls/o	R	G	S
mindorensis subsp.	0.57	0.26	0.33	0.28	1.7	ls/r	R	G	LN
quezonensis									
mindor. ssp. globosa	0.56	0.30	0.31	0.30	1.8	ls/r	R	G	LN
loheri UC	0.56	0.24	0.21	0.17		fb/cw	T	C	S
mindor. ssp. tingkoyensis	0.56	0.27	0.45	0.30	1.2	ls/r	R	C	LN
nagtabonensis	0.56	0.19	0.22	0.08	2.5	d/o	RT	G	LS
diversifolia Malaya	0.56	0.23	0.23	0.14	2.4	d/o	R	G	S

vitellina	0.56	0.18	0.24	0.10	2.3	d/o	T	G	HE
citrina	0.56	0.18	0.23	0.12	2.4	d/o	S	C	HE
neobudica	0.56	0.17	0.16	0.12	3.5	d/o	F	G	HE
sp. Samoa Dbl.	0.55	0.19	0.23	0.10	2.4	ls/o	F	C	S ?
sp. whistlerii W 8798	0.56	0.26	0.27	0.16	2.1	ls/o	R	G	S
sp. Loher UC s.n.	0.56	0.24	0.21	0.17	2.7	fb/cw	T	C	S
lucyae	0.55	0.20	0.19	0.08	2.9	fb/cw	T	G	S
matavanuensis	0.55	0.26	0.26	0.15	2.1	ls/o	T	G	S
tiatulaensis	0.55	0.20	0.20	0.13	2.8	ls/o	T	C	HE
smithii	0.55	0.20	0.20	0.19	2.8	ls/o	RT	G	R
whistlerii ssp. faleuluensis	0.55	0.21	0.15	0.12	3.7	ls/o	R	C	HU
mindor. ssp. luzonensis	0.55	0.30	0.32	0.22	1.7	ls/r	R	C	LH
sp. W9539 matavanuensis	0.55	0.26	0.26	0.15	2.1	d/o	F	G	S
sp. (UC) 3949	0.55	0.25	0.25	0.16	2.2	ls/o	R	G	S
sp. 577	0.55	0.20	0.16	0.08	3.4	lb/cw	T	C	S
sp. Matoata cream	0.55	0.22	0.15	0.12	3.7	ds/o	R	G	S
deykei	0.55	0.16	0.32	0.09	1.7	d/o	RT	C	E
plicata	0.55	0.19	0.20	0.07	2.8	t/cw	T	G	E
Tioman Is. Malaysia TG	0.55	0.18	0.17	0.08	3.2	t/cw	RT	G	E
sp. Bostrom	0.55	0.19	0.15	0.10	3.7	p/o	R	C	S
longifolia	0.55	0.26	0.23	0.14	2.4	ls/o	R	G	S
mindor. ssp. squama	0.55	0.24	0.24	0.20	2.3	ls/r	R	G	LN
golamcoiana CAHUP 41930	0.55	0.20	0.15	0.13	3.7	ls/o	R	G	LS
querinoensis	0.55	0.19	0.13	0.14	4.2	d/o	R	C	S
sp. CAHUP18680	0.55	0.23	0.22	0.14	2.5	ls/o	R	C	S
sp. UC 49328 Mati, Davao	0.55	0.24	0.23	0.17	2.4	ls/o	R		S
ramosii	0.55	0.26	0.28	0.15	2.0	ls/o	R	G	S
shephardii	0.55	0.22	0.22	0.15	2.5	d/o	T	G	S
mindorensis ssp. gelba	0.54	0.29	0.22	0.29	2.5	l/r	R	G	LH
benguensis UC 14997	0.54	0.18	0.23	0.08	2.3	p/o	RT	G	E
cominsii IML 457	0.54	0.19	0.13	0.12	4.2	ls/o	T	C	HU
sp. Perpich 428 WHERE	0.54	0.17	0.15	0.08	3.6				E
bicolor	0.54	0.15	0.25	0.07	2.2	p/o	RT	G	S
purificacioniae plant lost	0.54	0.23	0.17	0.14	3.2	d/o	RT	C	S
sp. USDA 354241	0.54	0.20	0.21	0.11	2.6	d/o	R	G	HE
sp. IML 557 gracilis	0.54	0.20	0.22	0.10	2.6	fb/cw	T	C	S
kerrii hairy	0.54	0.23	0.22	0.10	2.5	ls/o	R		S
betchei W 3243 Upolu	0.54	0.20	0.15	0.11	3.6	ls/o	F	C	S
mindor. ssp. nagcarlanensis	0.54	0.22	0.30	0.21	1.8	ls/r	R	G	LN
savaiiensis	0.54	0.21	0.18	0.12	3.0	ls/o	T	G	S
surigaoensis	0.53	0.14	0.11	0.06	4.8	d/o	T	G	S
mindor. ssp. lalawanensis	0.53	0.29	0.26	0.20	2.0	ls/r	R		HH
edwinofernandoi	0.53	0.25	0.12	0.12	4.4	fb/cw	R	C	S
sp. W 9456	0.53	0.22	0.17	0.14	3.1	ls/r	T	G	S
sp. PNH 7889	0.53	0.20	0.27	0.10	1.5		F		S
crassicaulis 89053 DH	0.53	0.22	0.25	0.08	2.1	p/o	R	G	S

diversifolia 1981 Bogor	0.53	0.18	0.25	0.18	2.8	d/o	RT	G	S
crassicaulis	0.53	0.15					T		S
hainanensis 9757	0.53	0.21	0.26	0.14	2.0	ls/o	R	C	HE
pauciflora	0.53	0.26	0.21	0.26	2.5	ls/o	R	C	S
sp. Nagtabon yellow	0.53	0.16	0.23	0.08	2.3	p/o	T	G	E
anncajanoae	0.52	0.20	0.12	0.09	4.3	fb/cw	T	C	S
diversifolia el-nidicus	0.52	0.20	0.18	0.12	2.9	ls/o	T		S
finlaysonii Yap	0.52	0.20	0.15	0.11	3.5	p/o	RT	G	S
sp. Yap Singapore 2003	0.52	0.24	0.31	0.20	1.7	l/r	T	G	LH
sp. marginata	0.52	0.2074	0.17	0.12	3.1	ls/o	RT	C	S
telosmoides	0.52	0.22	0.23	0.14	2.3	ls/o	R		S
mindor. ssp. lagunaensis	0.52	0.26	0.25	0.24	2.1	ls/r	RT	G	LN
uncinata	0.52	0.27	0.29	0.28	1.8	ls/o	R	C	S
amoena ssp. bogorensis	0.52	0.21	0.14	0.20	3.7	p/o	R	C	S
cardiophylla 910302	0.52	0.18	0.20	0.07	2.6	d/o	RT	C	LS
vitellinoides	0.52	0.19	0.22	0.04	2.4	ls/o	F		E
mindorensis Schltr.	0.52	0.17	0.34	0.20		ls/r	R	G	LN
mindor. ssp. nuevaensis	0.52	0.17	0.35	0.25	1.5	ls/r	R	G	LN
quinquinervia (UC) 1013	0.52	0.22	0.34	0.09	1.5	ls/o	R	G	E
benviagara #54	0.52	0.21	0.13	0.16	4.0	d/o	R	C	S
mindorensis 890508	0.52	0.24	0.30	0.22	1.7	ls/r	R	G	LN
graveolens	0.52	0.19	0.21	0.06	2.5	d/o	R	C	E
fitoensis	0.52	0.22	0.15	0.10	3.5	ls/o	T		HU
sp. W 1106 as filiformis	0.52	0.21	0.18	0.09	2.9	ls/o	R		S
lamingtoniana	0.52	0.22	0.18	0.12	2.9	ls/o	T	C	S
isabelaensis	0.51	0.20	0.12	0.12		d/o	R	G	S
soligamiana	0.51	0.18	0.11	0.09	4.6	d/o	T	C	S
sp. UC 295	0.51	0.20	0.21	0.11	2.4	ls/o	T		S ?
sp. 577	0.51	0.20	0.16	0.08		lb.cw	T	C	S
lanceolata	0.51	0.22	0.27	0.09	1.9	l/cw	R	G	HE
mindorensis ssp. rosea	0.51	0.24	0.29	0.21	1.8	ls/r	R	G	LH
hamiltoniana	0.51	0.22	0.42	0.36	1.2	ls/o	R	G	HE
gigantangensis PNH 36787	0.51	0.15	0.19		2.9	ls/o	T		S
sp. W 10339 as diptera	0.51	0.20	0.12	0.11	4.3	ls/o	T		HU
lambii BISH 9905	0.51	0.21	0.17	0.22	3.0	d/o	T	C	S
mindorensis ssp. tacta	0.51	0.24	0.30	0.20		ls/r	R	G	LH
Cebu JP	0.51	0.18	0.22	0.11	2.3	d/o	T	G	S
pentaphlebia	0.51	0.18	0.23	0.09	2.2	d/o	T	G	HE
cagayanensis Monina	0.51	0.24	0.25	0.09	2.2	d/o	T		LN
isabelaensis	0.51	0.20	0.12	0.12	4.3	ls/o	RT		S
odorata CAHUP 19258	0.51	0.21	0.19	0.12	2.9	ls/o	T		S
butleriana (Purificacion #3)	0.51	0.22	0.29	0.14	1.8	d/o	T	G	2S
mindor. ssp. tacta	0.51	0.25	0.30	0.20	1.7	ls/r	R	G	LH
mindor. ssp. mendozae	0.50	0.25	0.38	0.19	1.3	ls/r	R	G	LH
mindor. ssp. condupla	0.50	0.23	0.29	0.17	1.7	ls/r	R	G	LH
mindor. ssp. hirsuta	0.50	0.24	0.30	0.25	1.7	ls/o	R	G	LH

aurigue. ssp. altocolora	0.50	0.20	0.06	0.12	8.3	d/o	R	G	S
landgrantensis	0.50	0.13	0.12	0.11	4.2	ls/o	RT	C	S
coronaplana	0.50	0.19	0.15	0.15	3.3	ls/o	R		S
cumi. ssp. kamagongensis	0.50	0.17	0.15	0.08	4.5	ls/o	T		S
cumi, ssp. catanduanensis	0.50	0.15	0.20	0.13		ls/o	T		LH
marisanii	0.50	0.19	0.11	0.14	4.5	d/o	R	G	S
mindor. ssp. bakerensis	0.50	0.25	0.29	0.18	1.7	ls/r	R	G	LN
mindor. ssp. ligulasepala	0.50	0.23	0.29	0.29	1.7	ls/r	R	G	HU/LN
purificacioniae	0.50	0.23	0.10	0.10	5.0	d/o	T	G	S
mindor. ssp. lagyoensis	0.50	0.23	0.30	0.25	1.7	ls/r	R	G	HU
samoensis W 1297	0.50	0.20	0.15	0.11	3.3	ls/o	R		S
landgrant. ssp. siniloanensis	0.50	0.22	0.15	0.13	3.3	ls/o	RT	C	S
blasher. ssp. bigaensis	0.50	0.25	0.11	0.14	4.5	ls/o	R		HU
blas yellow variant	0.50	0.21	0.07	0.10	3.8	d/o	RT	C	S
corona ssp. bakyaanensis	0.50	0.20	0.08	0.11	6.3	ls/o	R	C	S
mucronulata	0.50	0.20	0.30	0.20	1.7	ls/o	S		S
ranauensis	0.50	0.19	0.15	0.12	3.3	ls/o	T		LS
siniloanensis	0.50	0.18	0.15	0.11	3.3	p/o	RT	C	S
sp. Mt. Galego	0.50	0.18	0.20	0.14	2.5	ls/o	T		S
elsae	0.50	0.17	0.15	0.15		d/o	R		S
calyxminuta	0.50	0.16	0.20	0.08	2.5	p/o	T		E-HB
sp. Maximo Wayet Diffin	0.50	0.16	0.19	0.09	2.6	ls/o	T		E
marionii	0.50	0.11	0.15	0.06	3.3	d/o	R	G	E
tauensis	0.50	0.20	0.15	0.11	3.3	ls/o	R		S
querinoensis	0.50	0.15	0.15	0.08	3.3	p/o	T	G	HE
litii	0.50	0.14	0.12	0.12	4.2	p/o	T	G	S
perangensis	0.49	0.20	0.11	0.14	4.5	d/o	RT	C	S
aff. rumphii	0.49	0.16	0.17	0.08	2.9	l/cw	T	G	S
lanatooensis	0.49	0.18	0.17	0.14	2.9		T		
meridithii	0.49	0.17	0.24	0.08	2.0	d/o	T	G	E
crassicaulis ends up	0.49	0.18	0.21	0.09	2.3	d/o	T	G	E
mindor. ssp. mabilogensis	0.49	0.30	0.30	0.25	1.6	ls/r	R	G	LH
crassi. 90143 Catanduanes	0.49	0.16	0.19	0.05	2.6	p/o	T	G	S ?
cystiantha	0.49	0.23	0.20	0.11	2.5	l/cw	R	G	S
wayetii	0.48	0.15	0.16	0.04	3.2	fbcw	T	C	EE
linearis TN	0.48	0.19	0.16	0.09		l/cw	R	G	S
maxima Sulawesi	0.48	0.16	0.19	0.18	2.5	f/cw	T	C	E
910301 DH BA	0.48	0.16	0.18	0.08		d/o	T	C	LS
Vial #20 GM cf Fitchii	0.48	0.19	0.14	0.14	3.4	d/o	R	G	S
sp. PNH 14203 Palawan	0.48	0.20	0.18	0.13	2.7	p/o	RF	G	HU
crassicaulis PT	0.48	0.19	0.23	0.09	2.1	d/o	RF	G	
teodymendozae	0.48	0.19	0.18	0.08	2.7	ls/o	RT	G	E
valmorianana (blas. ssp.)	0.48	0.23	0.10	0.15	4.8	d/o	R	C	S
williamoliveriana	0.48	0.20	0.13	0.10	3.7	l/cw	T	C	R
waymaniae	0.48	0.12	0.09	0.07	5.3	Uniq	R	G	S
sp. CAHUP 3935	0.48	0.17	0.22	0.08	2.2	p/o	RT	G	LS

sulitii PNH 10147	0.48	0.19	0.26	0.12	1.8	ls/o	R		LS
crassicaulis #14440	0.48	0.18	0.21	0.09	2.3	ls/o	R		S
crassicaulis	0.48	0.19	0.23	0.09	2.1				S
crassicaulis 5297 (CAHUP)	0.47	0.14	0.15	0.14	3.1				S
palawanensis ssp. majora	0.47	0.20	0.10	0.12	4.7	d/o	R	C	S
makatongensis	0.47	0.18	0.13	0.15	3.6	d/o	RT	C	S
marlowii ssp. infantaensis	0.47	0.16	0.20	0.08	2.4	d/o	RT	C	LS
luatekensis	0.47	0.20	0.17	0.14	2.8	ls/o	R	G	HU
bebsguevarrae	0.47	0.21	0.13	0.10	3.6	d/o	T	C	S
benvergarae ssp. gelba	0.47	0.20	0.19	0.12	3.1	d/o	T	C	S
linapauliana	0.47	0.20	0.15	0.14	3.1	d/o	R	G	S
linapauliana ssp. verida	0.47	0.20	0.13	0.14	3.6	d/o	T	C	S
linapauliana ssp. nakarensis	0.47	0.20	0.15	0.15	3.1	d/o	R	C	S
mindor. ssp. siniloanensis	0.47	0.19	0.23	0.18	2.0	ls/r	R	G	LN
marlowii	0.47	0.14	0.18	0.09	2.6	p/o	R	G	LS
clemensiorum	0.47	0.16	0.22	0.07	2.1	p/o	R	G	E
sp. 900307 JP merrillii	0.47	0.19	0.12	0.13	3.9	fb/cw	T	G	S
palawanensis	0.47	0.19	0.10	0.12	4.7	d/o	R	C	HU
pala. ssp. minora	0.47	0.20	0.12	0.11	3.9	d/o	RT	C	S
sp. filiformis	0.47	0.21	0.27	0.14	1.7		R		S
tamaleaaae	0.47	0.21	0.15	0.11	3.1	ls/o ?	F		S
sp. PNH 5733	0.47	0.16	0.18	0.15	2.6	ls/o	T		
sp. Long Miau TG 1305	0.47	0.14	0.26	0.06	1.8	p/o	T	C	E
sp. 2012-4-029	0.47	0.18	0.17	0.12	2.8	d/o	R	C	S
marvinii	0.47	0.17	0.12	0.06	3.9	ls/o	R		E
900355	0.47	0.16	0.19	0.09	2.5	d/o	T	G?	HS
Poring Hot Springs, Sulawesi	0.47	0.15	0.18	0.09	2.6	ls/o	T		LS
sp. whistlerii W 7605	0.47	0.20	0.17	0.14	2.8				S
bicknellii	0.46	0.15	0.12	0.05	3.8	lb/o	T	G	S
cajanoae	0.46	0.20	0.21	0.11	2.2	d/o	T	C	LS
aurigueana	0.46	0.24	0.11	0.10	4.2	d/o	T	G	S
mindor. ssp. granulata	0.46	0.23	0.25	0.20	1.8	ls/r	R	G	LH
lavacensis	0.46	0.18	0.14	0.12	3.3	p/o	R	G	S
lagunaensis	0.46	0.18	0.14	0.10	3.3	d/o	T	G	S
cagayanensis UC 45730	0.46	0.26	0.39	0.27	1.2	d/o	T		LN
incrassata (catanduanes)	0.46	0.16	0.20	0.08	2.3	d/o	F	G	E
forbesii	0.46	0.19	0.22	0.07	2.1	d/o	R	C	E
persicina subsp. triplexa	0.46	0.19	0.13	0.16		ls/o	I	C	S
kanyakumariniana	0.46	0.16	0.11	0.06	4.2	fb/cw	F	C	S
auripigmenta	0.45	0.21	0.15	0.15	3.0	d/o	R	C	S
blasher. ssp. diluta AC #4	0.45	0.17	0.15	0.15	3.0	ls/o	F		S
benstoneana	0.45	0.18	0.15	0.12	3.0	d/o	RT	G	S
chiekoae	0.45	0.13	0.10	0.06	4.5	fb/cw	F	C	S
corollanerva	0.45	0.20	0.15	0.15	3.0	ls/o	R	G	R
ilagiorum	0.45	0.17	0.17	0.12	2.6	p/o	T	G	R
marizae	0.45	0.18	0.19	0.14	2.4	d/o	RT	G	S

persicina	0.45	0.19	0.10	0.12	4.5	ls/o	R	C	S
persicina ssp. rosea	0.45	0.18	0.15	0.12	3.0	d/o	R	G	S
crassic. ssp. mendozae	0.45	0.12	0.20	0.09	2.3	d/o	T	G	HE
mindor. ssp. corollastriata	0.45	0.19	0.28	0.21	1.6	ls/r	R	G	LH
myrme. ssp. kapatalanensis	0.45	0.16	0.13	0.12		ls/o	RT	C	R
persicina ssp. lalawanensis	0.45	0.19	0.12	0.14	3.8	ls/o	T	C	S
foxii PNH 5032	0.45	0.21	0.41		1.1		RT		
persicina ssp. inawaensis	0.45	0.20	0.15	0.15	3.0	d/o	R	G	S
aurigipigm. ssp. papillata	0.45	0.20	0.13	0.15	3.5	d/o	F	C	S
crassicaulis 46116 UC	0.45	0.14	0.22	0.08	2.0	ls/o	T	C	E
cardiophylla 910301 DH	0.45	0.14	0.18	0.07	2.5	d/o	RT	C	LS
chiekoe	0.45	0.14	0.10	0.06			F	C	S
velasioii ssp. grandiora	0.45	0.13	0.20	0.08	2.3	d/o	R		LS
kentiana Perpich 428	0.45	0.15	0.14	0.05	3.0	lb/cw	T	G	R
obtusata	0.45	0.14	0.08	0.05	5.6	lb/cw	T	G	R
quadrata	0.45	0.14	0.08	0.05	5.6	fb/cw	T	G	R
marlowii	0.45	0.14	0.18	0.09	2.5	p/o	R	G	LS
marlowii ssp. polilloensis	0.45	0.15	0.20	0.11	2.3	p/o	RT		LS
bicolor ssp. polilloensis	0.45	0.15	0.29	0.09	1.6	d/o	RT	G	R
rosarioae	0.45	0.14	0.10	0.05	4.5	fb/cw	T		R
sp. NH #1	0.45	0.17	0.16	0.16		t/o	F	G	S
NS-0009	0.45	0.10	0.19	0.05	2.4	l/cw	T	G	
sp. NH # 1	0.45	0.17	0.12	0.12	3.8	t/cw	F	G	S ?
tamayensis	0.45	0.20	0.13	0.14	3.5	ls/o	T	C	S
sp. IML 1056	0.44	0.19	0.13	0.05	3.5	ls/o	RT	G	LS
alwitriana	0.44	0.17	0.19	0.08	2.3	d/o	T	C	LS
aurantiaca	0.44	0.19	0.11	0.15	4.0	ls/o	T	C	S
aurantiaca ssp. armenia	0.44	0.19	0.15	0.16	2.9	l/o	T		S
lucbanensis ssp. auroraensis	0.44	0.20	0.17	0.10	2.6	p/o	RT	C	HE
aurantiaca ssp. lagyoensis	0.44	0.20	0.14	0.13		d/o	T		S
samoaalbiflora.	0.44	0.21	0.21		2.1	ls/o	R		
bakyaanensis	0.44	0.20	0.10	0.15	4.4	d/o	R	C	S
blashernaezii	0.44	0.20	0.27	0.20	1.6	ls/o	F	C	LN
penta	0.44	0.15	0.10	0.06	4.4	t/cw	T	G	
solaniflora UC 18214	0.44	0.20	0.23	0.13	1.9	ls/o	R		S
kastbergii UC 203003	0.44	0.18	0.17	0.07	2.6	t/cw	T	C	E
olosegaensis	0.44	0.18	0.17	0.11	2.6	ls/o	R		LN
sp. EG 06097	0.44	0.16	0.13	0.10	3.4	d/o	RT	C	S
catanduanensis	0.44	0.17	0.17	0.14	2.6	ls/o	T		S
sp. latifolia	0.44	0.15	0.12	0.10	3.7	d/o	T	G	HU
micrantha	0.44	0.14	0.09	0.08	4.9	fb/cw	T	C	S ?
armeniaca	0.43	0.15	0.12	0.12	3.6	d/o	RT	G	S
rizaliana	0.43	0.17	0.08		5.3	fb/cw	F	C	R
burtoniae	0.43	0.15	0.14	0.07	3.1	fb/cw	T	G	LS
davidgoyderiae	0.43	0.20	0.12	0.10	3.6	ls/o	T	C	S
fitchii	0.43	0.17	0.11	0.12	3.9	ls/o	R	G	S

lucbanensis	0.43	0.17	0.16	0.04	2.7	p/o	R	C	2S
lucardenasiana	0.43	0.14	0.23	0.13	1.9	d/o	R		HE
liljebjorniana	0.43	0.18	0.15	0.14	2.9	ls/o	R	C	S
polilloensis	0.43	0.16	0.19	0.07	2.7	d/o	R	G	E
rhodostella	0.43	0.18	0.12	0.09	3.6	fb/cw	RT	G	S
sp. PUH 11859 Leyte	0.43	0.13	0.23	0.09	1.9	d/o	F		LS
imbric. speck. mottled lf.	0.43	0.16	0.13	0.07	3.3	t/o	R		R
velasioii Kloppenburg	0.43	0.14	0.15	0.08	2.9	p/o	RT	G	LS
ralphdavissoniana	0.43	0.18	0.15	0.15	2.9	ls/o	F	C	S
blashern. ssp.	0.43	0.25	0.14	0.15	3.1	ls/o	R	C	S
maragondonensis									
opposita	0.43	0.16	0.15	0.10	2.9	ls/o	R	G	S
espaldoniana	0.42	0.18	0.10	0.09	4.2	fe/o	T	G	S
anncajano. ssp. lagyoensis	0.42	0.19	0.15	0.09	2.8	fb/cw	RT	G	S
vicencioana ssp. querinoens.	0.42	0.15				d/o	T	G	S
NS05-206	0.42	0.14	0.11	0.11	3.8	d/o	R		S
anneleesoligamae	0.42	0.15	0.18	0.07	2.3	d/o	F	C	LS
gelba	0.42	0.18	0.17	0.10	2.5	d/o	R	G	HU
blashern. ssp. ferreriasiana	0.42	0.20	0.10	0.15	2.8	ls/o	F	C	S
kanalaonensis	0.42	0.20	0.15	0.10	2.8	fb/cw	T	G	S
katherinechallisiana	0.42	0.20	0.14	0.16	3.0	d/o	R	C	S
myrmecopa	0.42	0.16	0.17	0.10	2.5	fb/cw	F	C	HL
persic. ssp. tagumpayensis	0.42	0.19	0.12	0.15	3.5	d/o	R	C	S
persic. ssp. tingkoyanensis	0.42	0.19	0.15	0.14	2.6	d/o	T	G	S
pimenteliana	0.42	0.20	0.24	0.20	1.8	ls/o	T	G	LN
sp. UC 49395 fischeriana	0.42	0.18	0.23	0.15	1.8	ls/o	R		HE
quinquinervia 81100	0.42	0.16	0.13	0.10	3.2	ls/o	F	G	S
blasher. ssp. tingkoyanensis	0.42	0.19	0.16	0.12	2.8	d/o	T	C	S
vicencioana	0.42	0.15	0.15	0.17	2.8	ls/o	R		HU
NS00-004	0.42	0.16	0.10	0.06	4.2	fb/cw	T	C	S
blass. ssp. recurvula	0.42	0.21	0.11	0.15		p/o	T	C	HU
blass. ssp. straminea	0.41	0.21	0.13	0.16	3.4	d/r	R	C	S
eburnea	0.41	0.18	0.16	0.12	2.6	d/o	RT	G	S
cremora	0.41	0.19	0.12	0.10	3.1	d/o	R	C	HU
faoensis W 5714	0.41	0.20	0.11	0.14	3.7	d/o	T	G	S
CAHUP 5967 incrassata	0.41	0.15	0.17	0.08	2.4	d/o	RT		S
obscura PT 1979	0.41	0.14	0.13	0.06	3.2	fb/o	F	C	LS
sp. PNH 37800 Irosin	0.41	0.16	0.16	0.12	2.6	fb/o	R	C	S ?
sp. PNH 349	0.41	0.19	0.21	0.11	2.0		R		E
neuvaensis	0.41	0.18	0.18	0.12		ls/o	R	G	S
retusa	0.41	0.14	0.24	0.14	1.7	d/o	R	G	HU
sp. PNH 4854	0.41	0.16	0.18	0.08	2.3	d/o	F	G	HE
affina	0.40	0.15	0.10	0.06	4.0	fb/cw	T	C	S
sp. PNH 4936	0.40	0.14	0.11	0.07	3.6	fb/cw	F	G	S
inawaensis	0.40	0.19	0.12	0.13	3.3	ls/o	R	C	S
heuschk. subsp. cajanoae	0.40	0.21	0.20	0.14	2.0	ls/o	R	C	LN

bordenii UC 15829	0.40	0.24	0.16	0.12	2.5	ls/o	R		S
macgregorii PNH 15541	0.40	0.15	0.15	0.12	2.7	ls/o	F	G	HU
inconspicua	0.40	0.15	0.10	0.04	4.0	l/o	F	C	E ?
sp. pottsii W 8508	0.40	0.22	0.13	0.11	3.1	d/o	RF	C	S
blashernaезii ssp. carnea	0.40	0.22	0.15	0.13	2.7	ls/o	R	C	S
nuuuliensis	0.40	0.22	0.13	0.11	3.1	ls/o	RF	G	S
renuncola	0.40	0.20	0.12	0.13	3.3	d/o	R	C	S
indentata	0.40	0.12	0.10	0.08	4.0	tb/cw	RT		
markoi	0.40	0.15	0.12	0.10	3.3	ls/o	R	G	S
blasher. ssp. eudaimononia	0.40	0.20	0.15	0.15	2.7	d/o	F	G	S
blasher. ssp. inawaensis	0.40	0.21	0.15	0.15	2.7	d/o	RT	C	S
sp. PNH 11951 cf. incrassata	0.40	0.15	0.17	0.15	2.4	ls/o	T		LS
blasher. ssp. infantaensis	0.40	0.21	0.18	0.18	2.2	d/o	T		S
blasher. ssp. lagyoensis	0.40	0.17	0.15	0.13	2.7	d/o	RT	C	S
blasher. ssp. straminea	0.40	0.21	0.17	0.18	2.4	d/o	T	G	S
blasher. ssp. tangerina	0.40	0.21	0.11	0.15	3.6	d/o	RT	C	HU
blasher. ssp. truncata	0.40	0.20	0.13	0.14	3.1	d/o	T	G	S
blasher. ssp. tagumpayensis	0.40	0.20	0.15	0.18	2.7	d/o	T	G	S
blasher. ssp. lalawinanensis	0.40	0.21	0.18	0.12	2.2	d/o	RT	C	S
blasher. ssp. grandiora	0.40	0.18	0.12	0.12	3.3	p/o	F	G	S
sp. affinis australis Balasik	0.40	0.17	0.16	0.11	2.5	ls/o	R		HE
scortechinii	0.40	0.21	0.23	0.13	1.7	l/cw	RT	G	LN
odorata PNH 18041 paziae	0.40	0.15	0.20	0.08	2.0	p/o	F	G	LS
querinoensis CAHUP 41946	0.40	0.19	0.20	0.15	2.0	d/o	RT		S
histora CAHUP 5292	0.40	0.15	0.19	0.06	2.1	ls/o	T	C	E
blashernaезii ssp.	0.39	0.20	0.13	0.12	3.0	d/o	R	G	S
nuevavizcayaensis									
blash. ssp. aurantiaca	0.39	0.20	0.19	0.13	2.1	p/o	RT	C	S
lagyaensis	0.39	0.17	0.10	0.13	3.9	d/o	T	C	S
afuangae	0.39	0.17	0.11	0.10		d/o	T	C	S
polystachya Java	0.39	0.16	0.15	0.12	2.6	d/o	RT	G	S
moninae	0.39	0.17	0.11	0.05	3.5	d/o	R		S
mamagongensis	0.39	0.18	0.16	0.13	3.9	d/o	T	C	S
ferrerasii	0.39	0.18	0.18	0.10	2.2	d/o	T	C	LS
tagumpayensis	0.39	0.17	0.09	0.12	4.3	d/o	F	C	S
wayetii ssp. lagyoensis	0.39	0.17	0.10	0.10	3.9	fb/cw	F	C	R
blashernaезii ssp. siariae	0.39	0.29	0.15	0.14	2.6	d/o	T	G	S
kamangongensis	0.39	0.19	0.15	0.12	2.6	d/o	R	C	S
littoralis IML 708	0.39	0.15	0.15	0.06	2.6	fb/o	F	G	HS
verticillata	0.39	0.18	0.18	0.10	2.2	ls/o	T	G	S
blasher. ssp. vadacorolla	0.38	0.20	0.16	0.14	2.4	d/o	R	C	S
eburna ssp. infantaensis	0.38	0.15	0.12	0.12	3.2	d/o	R	G	HU
CAHUP 5269	0.38	0.15	0.11	0.07	3.5	d/o	RF		S
blasher. ssp. aurantiaca	0.38	0.20	0.16	0.15		ls/o	R		S
columna	0.38	0.16	0.09	0.10	4.2	p/o	RT	G	HU
sulu-anensis	0.38	0.16	0.17	0.09	2.2	d/o	RT	G	2S

CAHUP 63826	0.38	0.15	0.16	0.07	2.4	p/o	R		2S
ignota	0.38	0.16	0.20	0.09	1.9	fb/cw	T	C	R
lasiantha	0.38	0.13	0.19	0.08	2.0	d/o	R	G	LS
maximowayetii	0.38	0.15	0.16	0.13	2.4	ls/o	T		R
nummularioides	0.38	0.12	0.15	0.09		fb/cw	F		R
panayensis	0.37	0.14	0.13	0.07	2.8	fb/cw	F	G	S
baguioensis	0.37	0.14	0.16	0.12	2.3	ls/o ?	RT		S
sp. CAHUP 5293-5392	0.37	0.16	0.19	0.15	1.9	ls/o ?	R		S
sp. PNH 39370	0.37	0.16	0.12	0.11	3.1	ls/o	RT		HU/
CAHUP 41945	0.37	0.16	0.20	0.13	1.9	p/o	R	G	S
mata-ole-afiensis	0.37	0.18	0.15	0.12	2.5	ls/o ?	R		
NS005	0.37	0.16	0.18	0.13	2.1	p/o	R	G	S
blasher. ssp. mendozae	0.37	0.22	0.13	0.13	2.8	d/o	R		S
lacunosa	0.37	0.14	0.10	0.06	3.7	fb/cw	F	C	R
brevialata	0.37	0.14	0.11	0.06	3.4	fb/cw	FT	G	S
coronarosea	0.37	0.15	0.18	0.16	2.1	fb/cw	F	G	S
stafeensis	0.37	0.15	0.10	0.06	3.7	fb/cw	F	C	2S
lambioae	0.37	0.15	0.10	0.10	3.7	d/o	T	C	S
multisepala	0.37	0.18	0.16	0.14	2.3	ls/o	R	C	S
rima	0.37	0.14	0.08	0.07	4.6	fb/cw	T	C	S
blasher. ssp. armerina	0.37	0.19	0.16	0.14	2.3	d/o	R	G	S
baguioensis	0.37	0.19	0.16	0.12	2.3	ls/o	RT		HU
IPPS 8860	0.37	0.13	0.15	0.09	2.5	d/o	R	G	S
UC-BO 32378 where ?	0.37	0.14	0.13	0.07	2.8				
tomatoensis	0.37	0.16	0.08	0.09	4.6	d/o	R	C	S
blasher. ssp. kamagongensis	0.36	0.20	0.13	0.13	2.8	d/o	R	C	S
sp. UC 424 Zamboanga	0.36	0.15	0.12	0.15	3.0	fb/cw	T		HU
spartioides	0.36	0.23	0.25	0.25	1.4	l/r	R	G	HU
blasher. ssp. nagcarlanensis	0.36	0.20	0.10	0.14	3.6	ls/r	T	G	S
blasher. ssp. parviora	0.36	0.21	0.15	0.15	2.4	d/o	T	G	LH
blasher. ssp. taywanisensis	0.36	0.20	0.10	0.17	3.6	ls/o	R	C	S
sipitangensis	0.36	0.09	0.06	0.04	6.0	fb/cw	F	C	S
burtoniae	0.36	0.14	0.07	0.05	5/1	fb/cw	T	C	S
poolei	0.36	0.14	0.13	0.06	2.8	fb/cw	T	C	S
lacunosa var. pallida	0.36	0.14	0.09	0.05	4.0	fb/cw	T	G	R
geotropa	0.36	0.13	0.20	0.07	1.8	fb/cw	RT	C	S?
papaschonii	0.36	0.10	0.08	0.06	4.5	l/o	R		E ?
blasher. ssp. karencaseae	0.35	0.23	0.12	0.15	2.9	ls/o	T		S
blasher. ssp. simeonae	0.35	0.20	0.14	0.14	2.5	d/o	F	C	S
blasher. ssp. marizae	0.35	0.20	0.15	0.10	2.3	ls/o	T	C	LH
concava CAHUP 5991	0.35	0.13	0.14	0.12	2.5	ls/o	T		HU
apoensis var. sagittaria	0.35	0.08	0.13	0.08	2.7	fb/cw	R	G	2S
bebsguevarrae	0.35	0.12	0.10	0.08	3.5	p/o	F	C	S
bicolensis	0.35	0.15	0.08	0.08	4.4	p/o	RT		S
mitisa	0.35	0.12	0.11	0.05	3.2	fb/cw	F	C	E
carmelea	0.35	0.16	0.17	0.11	2.1	ls/o ?	F		HE

eburna ssp. rosea	0.35	0.15	0.08	0.10	4.4	ls/o	R	G	S
eitapensis	0.35	0.15	0.10	0.09	3.5	fb/o	RT	G	LS
ginabrigidana	0.35	0.14	0.06	0.09	5.8	ls/o	R	G	S
crassicaulis Type 14440	0.35	0.14	0.15	0.08	2.3	ls/o	T	C	E
sp. polystachya alba	0.35	0.19	0.18	0.11	1.9	d/o	RF	G	S
parviflora	0.35	0.14	0.10	0.08	3.5	ls/o ?	F		S
pseudolittoralis	0.35	0.14	0.12	0.05	2.9	fb/cw	F	C	S
pseudoleytenis ssp. majora	0.35	0.13	0.10	0.08	3.5	fb/cw	RT	C	S
davidcummingii	0.35	0.17	0.30	0.10	1.2	fb/cw	T	G	HE
foliapalmata	0.35	0.17	0.13	0.11		ls/o	R	G	HU
salmonea	0.35	0.14	0.10	0.10	2.5	d/o	T	G	S
salmonea ssp. pallida	0.35	0.17	0.10	0.15	3.5	d/o	T	G	S
foliapalmata	0.35	0.17	0.13	0.11	2.7	ls/o	R	G	HU
blasher. ssp. luzonensis	0.34	0.22	0.12	0.13	2.8	d/o	T	C	S
corazoniae	0.34	0.12	0.10	0.09	3.4	fb/cw	RT	C	HE
heusch. ssp. mendozae	0.34	0.18	0.17	0.11	2.0	ls/o	R	C	HE
setsukokobayashiae	0.34	0.13	0.08	0.04	4.3	fb/cw	RT	C	S
tsangii	0.34	0.13	0.18	0.10	1.9	fb/cw	T	G	S
krohniana Kloppeburg	0.34	0.13	0.09	0.04	3.8	fb/cw	TF	C	S
as brittonii	0.34	0.15	0.06	0.07	5.7		T		
navicula	0.34	0.15	0.17	0.11	2.0	ls/o	RT		S
nummularioides (pink)	0.34	0.12	0.15	0.09	2.3	fb/cw	F	G	R
krohniana ssp.	0.33	0.14	0.08	0.06	4.1	fb/cw	TF	G	HB
lalawinanensis									
auroraensis	0.33	0.15	0.10	0.09	3.3	ls/o	RT		S
samarensis	0.33	0.14	0.14	0.11	1.7	ls/o	T		S
coronarubra	0.33	0.16	0.10	0.12	3.3	ls/o	T	G	S
apoensis	0.32	0.16	0.08	0.06	2.5	fb/cw	TF	C	S
diptera	0.32	0.16	0.13	0.06	2.5	ls/o	R	C	S
latifolia	0.32	0.15	0.16	0.10	2.0	ls/o	RF	G	S
odetteae	0.32	0.12	0.09	0.08	3.6	fb/cw	T	G	S
taywanisensis Klop. & Mend	0.32	0.12	0.09	0.10	3.6	fb/cw	F	G	S
pseudoleytenis	0.32	0.15	0.05	0.08	6.4	fb/cw	F	C	S
blasher. ssp. rosea AC #5	0.32	0.15	0.15	0.10	2.1	d/o	R		S
marquisii	0.32	0.15	0.22	0.14	1.5	ls/o	T	C	S
acanthocitrina	0.32	0.12	0.08	0.08	2.5	fb/o	T	C	S
capitata	0.32	0.12	0.09	0.08	3.6	l/cw	T	C	S
biespada	0.31	0.13	0.15	0.04	2.1	fb/o	T	C	HU
heusch. ssp. marionii	0.31	0.17	0.18	0.13	1.7	ls/o	R	C	R
sp. IML 850 affin. Macgregori	0.31	0.17	0.18	0.11	1.7	ls/o	T		S
camphorifolia (wrong)	0.31	0.15	0.08	0.08	3.9	ls/o	T		S
Lisa V-2	0.31	0.11	0.16	0.05	1.9	fb/o	F	G	E
realensis	0.31	0.11	0.11	0.04	2.8	fb/cw	F	C	S
tangerina	0.31	0.13	0.06	0.06	5.2	fb/cw	RT	G	S
memoria	0.31	0.11	0.05	0.05	6.0	fb/cw	F	C	S
heuschkeliana	0.30	0.15	0.15	0.15	2.0	fb	T	C	R

loheri ssp. tawanensis	0.30	0.15	0.07	0.12		Tru.	T	C	HU
william. subsp. calendulina	0.30	0.11	0.10	0.07	3.0	ls/o	R	G	S
walliniana	0.30	0.13	0.10	0.04	3.0	l/o	F	C	S
bifunda ssp. integra	0.29	0.14	0.06	0.09	4.8	l/o	R	C	S
IML 232 Kuching.	0.29	0.12	0.06	0.05	4.8	fb/cw	T	C	S.
pallilimba	0.29	0.12	0.08	0.05	3.6	fb/cw	T	C	LS
nyhuusiae	0.29	0.13	0.11	0.07	2.6	p/o	R	C	S
bifunda ssp. obtusa	0.29	0.13	0.06	0.08	4.8	d/o	R	G	S
IPPS 8870	0.29	0.10	0.13	0.10	2.2	l/cw	R	C	HU
subrosea	0.28	0.15	0.09	0.08	3.2	p/o	R	C	S
aurea ssp. nagcarlensis	0.28	0.09	0.08	0.06	3.5	fb/cw	R	C	S
cyclaminea	0.28	0.12	0.06	0.04	4.7	ls/o	R	G	S
nabawanensis	0.28	0.12	0.17		1.6	fb/cw	T	C	LS
pinnata	0.28	0.12	0.10	0.07	2.8	p/o	T		S
barbonii	0.28	0.11	0.13	0.04	2.2	lb/cw	T	C	LS
hirsuta	0.27	0.11	0.06	0.03	4.5	fb/cw	T	C	LS
CAHUP 9035	0.27	0.10	0.13	0.10	2.1		T		S
Bada TG	0.27	0.11	0.06	0.06	4.5	fb/cw	F	G?	S
trista	0.27	0.12	0.06	0.06	4.5	p/o	F		HU
viscayaensis	0.27	0.10	0.08	0.08	3.4	ls/o	RF	G	HU
celsa	0.26	0.10	0.12	0.09	2.2	fb/cw			S
nakarensis	0.26	0.13	0.06	0.09	4.3	d/o	R		HU
bakerensis	0.26	0.10	0.10	0.08	2.6	ls/o	F		S?
rosarioae	0.26	0.07	0.11	0.04	2.4	fb/o	T	C	LS
affinis MR	0.26	0.11	0.08	0.03	3.3				LS
sp. F-428 Kuching Borneo	0.26	0.14	0.07	0.04	3.7	fb/cw	F		
sp. TN 99-002	0.26	0.12	0.08	0.05	3.3	fb/cw	F	C	LS
unica	0.26	0.10	0.05	0.04	5.2	fb/cw	T	C	LS
unica ssp. aurantiaca	0.26	0.10	0.06	0.08	4.3	fb/cw	T	C	LS
albida	0.25	0.09	0.10	0.08	2.5	d/o	R		S
maubanensis	0.25	0.13	0.08	0.09	3.1	d/o	R	C	S
marananiae	0.25	0.13	0.05	0.06	5.0	ls/o	R		HU
nakarensis ssp. cadmia	0.25	0.12	0.06	0.10	4.2	ls/o	R		S
lagyoensis	0.25	0.10	0.06	0.08	4.2	ls/o	RT	C	S
neuvaensis	0.25	0.10	0.08	0.04	3.1	fb/cw	T	C	LS
revoluta	0.25	0.11	0.05	0.05	5.0	fb/cw	T	C	S
yapiana	0.25	0.12	0.06	0.04	4.2	fb/o	T	C	LS
IPPS 1779	0.25	0.09	0.06	0.05	4.2	fb/o	F	G	S
aurea	0.24	0.07	0.04	0.04	6.0	fb/cw	T	G	S
leticiae	0.24	0.10	0.04	0.02	6.0	fb/o	T	C	HH
unruh. ssp. maubanensis	0.24	0.14	0.05	0.08	4.8	p/o	T	C	S
martinii ssp. daraitonensis	0.24	0.12	0.07	0.08		ls/o	RT	G	HU
marvinii	0.24	0.08	0.07	0.03	3.4	fb/cw	RF	C	R
martinii	0.24	0.10	0.07	0.05	3.4	ls/o	F	C	S
acanthodissimila	0.24	0.10	0.04	0.12	6.0	ls/o	T	C	R
sp. s.n. Taylor UC	0.24	0.10	0.08	0.05	3.0	l/o	RT		S

unruhiana	0.24	0.11	0.09	0.07	2.2	p/o	R	G	S
subrosea ssp. inawaensis	0.23	0.14	0.08	0.12	2.9	ls/o	R	G	HU
acanthominima	0.23	0.10	0.07	0.07	2.9	fb/cw	F	C	S
acanthotruncata	0.23	0.13	0.06	0.06	3.8	fb/cw	T	G	S
bifunda	0.23	0.10	0.06	0.06	3.8	l/o	R	C	HU
cupa	0.23	0.12	0.06	0.06	3.8	ls/o	RT		S ?
engleriana			0.23	0.10		l/cw			R
taeahwa ssp. tayuncisensis	0.23	0.12	0.06	0.04	3.8	fb/cw	T	C	R
nagcarlanensis	0.23	0.11	0.07	0.04	2.9	fb/cw	T	C	S
taeahwa	0.23	0.08	0.07	0.04	2.9	fb/cw	T	C	LS
caespitosa	0.22	0.05	0.08	0.04	2.9	fb/cw	Y	G	LS
bulba	0.22	0.07	0.07	0.07	3.1	fb/cw	RF	C	S
capotoanensis 15642	0.22	0.05	0.15	0.10	1.5	ls/o	R		LS
capotoanensis ssp. quezone.	0.22	0.12	0.07	0.08		ls/o	R	C	HU
liquida	0.22	0.09	0.07	0.03	3.1	fb/cw	T	C	R
linguiforma	0.22	0.09	0.07	0.04	3.1	fb/cw	P	C	LS
acanthopenta	0.22	0.11	0.07	0.07	3.1	fb/cw	F		R
bilobata Ben H, TG	0.22	0.08	0.06	0.05	3.7	fb/cw	F		S
bilobata red edge	0.22	0.09	0.07	0.06	3.1	fb/cw	RF		S
cupula	0.21	0.08	0.05	0.07	4.2	fb/cw	T	G	S
rosarioae ssp. realensis	0.21	0.10	0.05	0.04	4.2	fb/cw	T	C	S
bilobata Monina 1	0.21	0.11	0.04	0.05	5.3	fb/cw	F		S
leytensis IML 228 ck 0.48	0.21	0.10	0.08	0.06	2.6	fb/cw	F	C	R
unica ssp. bakerensis	0.21	0.07	0.07	0.03	3.0	l/cw	T	C	E
carandangiana	0.21	0.09	0.07	0.09			RT	C	S
unica ssp. curvata	0.21	0.10	0.07	0.06	3.7	fb/cw	RT		S?
brittonii	0.19	0.08	0.05	0.04		fb/cw	F	G	S
picta Miq.	0.20	0.08	0.06	0.04	3.3	fb/cw	FT	G	S
amorosoae	0.20	0.09	0.05	0.05	4.0	fb/cw	F		S ?
williamsiana	0.20	0.10	0.07	0.08	2.9	d/o	T	C	S
bilobata	0.19	0.09	0.09	0.05	2.1	fb/cw	F		S
bilobata	0.19	0.08	0.05		3.8	fb/cw	RF	G	S
bilobata Monina 2	0.19	0.09	0.05	0.03	3.8	fb/o	F		S
minuta	0.19	0.08	0.06	0.06	3.3	lb/cw	R	C	S
sp. DS 1	0.19	0.08	0.05	0.05	3.8	fb/cw	F	G	S
artwhistlerii	0.19	0.08					RT		
tingkoyanensis	0.18	0.10	0.10	0.04		new	T		
kannana	0.15	0.06	0.06	0.05	2.5	fb/cw	T		S
minimapollinaria	0.15	0.06	0.06	0.07	2.5	lb/cw	T		S
minimapollinia AC #003	0.15	0.11	0.07	0.09	2.1	ls/o	T		S
reyesii	0.15	0.05	0.05	0.03	3.0	fb/cw	R	C	HU
parvapollinia	0.12	0.10	0.08	0.07	1.2	ls/o	T	G	S

Hoya

Pollinaria

Revised and Expanded

January 2007

July 2009

Sept. 2010

Jan. 2013

2014

April 2015

Sept. 2015

July 2016

A PHOTOGRAPHIC STUDY

Dedication

This work is dedicated to the serious student and researcher who wishes to learn more of the Genus *Hoya*. It is hoped it may lend additional data for pollen researchers in other *Asclepiad* genera and species. Mostly it is in appreciation of the intricacies of any study and the realization that no subject is simple once an in-depth inquiry is started. I wish to again thank all who have contributed of material and time to further my work in this field, their concern and helpful criticism is always appreciated.

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"The pollen masses present great variations in size, form, and length of pedicels and probably afford excellent characters".

J. D. Hooker 1838 in Flora of British India.

Table of Contents

<u>Subject</u>	<u>Page</u>
Dedication	ii
Statement	iii
Table of contents	iv
Introduction	v
Acknowledgments	vi
Materials & Methods	1
Pollinarium Formation	3
Corona of Hoya	6
Stylar Table	7
Coronal Section	8
Labeled Pollinarium	9
Pollen Germination	10
Cross Section of Pollinaria	11
Translator & Caudicle Development	13
Retinaculum upper & lower	14
Pollinaria Develop. Stages	15
Terminology History	18
Measuring gauge	21
Pollinaria of 1 Flower	23
Pollinaria 5 years	25
Pollinaria different locations	30
Scanned Photos	
Hoya archboldiana Norman 1937	31
Hoya macgillivrayi Bailey 1914	32
Hoya multiflora Blume 1823	33
Hoya albiflora Zipp. ex Blume 1848	34
Hoya onychoides Forster 1995	36
Hoya sp. CAHUP 8359 (41559)	37
Hoya elliptica Hooker f. 1883	38
Hoya coriacea Blume 1826	40
Hoya lobii Hooker f. 1883	41
Hoya amrita Klopp., Siar & Ferreras 2011	42
Hoya imperialis Lindley 1846	43
Hoya coriacea ssp. philippinensis K,S & F	44
Hoya pubicorolla ssp. glabrapedicila K	46
Hoya pruinosa Miquel 185	47
Hoya apoensis ssp. sagittarius K et al 2010	48
Hoya odorata Schlechter 1906	49
Hoya chunii P. T. Li. 1984	51
Hoya obtusifolia Wight 1834	52
Hoya stoneana Klopp. & Siar 2006	53
Hoya imbricata basisub. Decaisne 1844	54
Hoya darwinii Loher 1910	55
Hoya lazaroii Klopp. & Siar 2007	56

Hoya skinneriana Klopp.	57
Hoya sp. UC 18941 (odorata)	58
Hoya mitrata Kerr 1940	60
Hoya coriacea subsp. toba TG	63
Hoya sp. salweenica	64
Hoya halconensis Klopp. 1990 NS 05-213	65
Hoya meliflua Blanco ex Merrill 1837	66
Hoya halconensis NS05-225	67
Hoya celeta Klopp. & Siar	68
Hoya darwinii ssp. mabilogensis Klopp.	69
Hoya mindorensis ssp. ehirsuta K et al.	70
Hoya meliflua subsp. fraterna Green 1995	71
Hoya odorata Schlechter 1906 TG	72
Hoya megalaster Warburg 1907	73
Hoya loyceandrewsiae Green 1995	74
Hoya irisae Ferreras, Klopp. etc	75
Hoya buotii Kloppenburg 2002	77
Hoya meliflua ssp. nuevaensis K. et al	78
Hoya pubicorolla ssp. anthracina K. 2013	79
davaoensis Green & Kloppenburg 2011	80
Hoya sp. PNH 9385 multiflora	81
Hoya pubicorolla Kloppenburg	82
Hoya australis subsp. australis IML 16	83
Hoya sp NS05-231 Mt. Halcon	84
Hoya meliflua ssp. darastanensis K et al	85
Hoya meliflua ssp. mendozai K et al	86
Hoya sp. CI #3	87
Hoya davaoensis Kloppenburg 2013	88
Hoya thompsonii Hooker f. 1883	89
Hoya motoskei Teijsm. & Binnend.1852	90
Hoya sp. UC 49272 meliflua	91
Hoya sp. UC 42238	92
Hoya excavata Teijsm. & Binnendi.1863	94
Hoya fraterna Blume 1849	95
Hoya arnottiana Wight 1843	96
Hoya sp. PNH 24031	97
Hoya sp. 297 ex India	98
Hoya sp. BSI #1	99
Hoya sp. PNH 13306	100
Hoya linavergarae Klopp. & Siar 2006	101
Hoya bella Hooker 1848	102
Hoya weebella Kloppenburg 2005	103
Hoya meliflua ssp. xyloniaiae Kl.et al 2016	105
Hoya sp. MT 13	106
Hoya sp. Thailand	107
(NOT) Hoya apiculata Scheff. 1896	108

Hoya carnosia R. Brown 1802	109
Hoya fuscomarginata N. E. Brown 1901	110
Hoya odorata ssp. antonionensis Klop. 2015	111
Hoya paziae Kloppenburg 1990	112
Hoya pachyclada Kerr 1939	113
Hoya carnosia R. Brown 1802 D124	114
Hoya cf. finlaysonii	115
Hoya densifolia as cumingiana	117
Hoya cf. betchei W 5165	118
Hoya chlorantha W 344 betchei	119
Hoya georgemendozai Klopp. et al	120
Hoya pseudorigida Klopp. et al	122
Hoya sp. W. 1983 betchei	123
Hoya rupicola Hill 1988	124
Hoya subquintuplinervis Miquel 1869	125
Hoya fungii Merrill 1934	126
Hoya greenii Klopp. 1995	127
Hoya acicularis Green 2002	128
Hoya chlorantha Rechinger 1908	130
Hoya australis subsp. oramicola Forster & Liddle 1991	132
Hoya odorata Schlechter 1906 UC 29638	133
Hoya hernaезii Klopp et al	134
Hoya sp. W 1796 Avala Ridge	135
Hoya purpureofusca Hooker 1849	136
Hoya cinnamomifolia Hooker 1848	138
Hoya australis ssp. nathaliae Klop, , Siar	140
Hoya darwinii ssp. minora Klopp et al.	141
Hoya odorata Schlechter, UC #14519	142
Hoya pubicenta Klop., Mrnd & Ferr. 2014	143
Hoya pubicorolla Kloppenburg 2013	144
Hoya vitiensis TG	145
Hoya sp. India #3	147
Hoya serpens Hooker f. 1883	148
Hoya leucorhoda Schlechter	149
Hoya paulshirleyi Green & Klopp. 2010	150
Hoya sp. Fresno Palmate Lf.	152
Hoya chlorantha var. tutuilensis Christ.	153
Hoya nicholsoniae Muller 1866 IML 39	154
Hoya sp. UPLB 50 TN	155
Hoya taytayensis Kloppenburg & Siar 2013	156
Hoya sp. CI #3	157
Hoya naumanii Schlechter	158
Hoya sp. Balasik Is. Sulawesi TG # 94112	159
Hoya santiagoi ssp. mandozai Klopp. 2013	160
Hoya betchei (Schltr.) Whistler W 3245	161
Hoya sp. Bangkok 4	162

Hoya dolichosparte Schlechter 1916	163
Hoya gildingii Kloppenburg 2001	164
Hoya cumingiana Decaisne 1844	166
Hoya sp PNH 806	167
Hoya imbricata Decaisne 1844	168
Hoya mindor. sub. superba K & Siar 2005	170
Hoya sp. PNH 1268	171
Hoya acuta Haworth 1821	172
Hoya vitiensis Turrill 1915	173
Hoya odorata UC 13806	174
Hoya dischorensis Schlechter 1913	176
Hoya acuta Haworth CT.	177
Hoya sp. (UC) 20732 as vitensis	178
Hoya golamcoiana Kloppenburg 1991	179
Hoya chlorantha Rechinger 1908 W 1977	180
Hoya imbricata ssp. lagunaensis K et al	181
Hoya kloppenburgii Green 2001	182
Hoya chlorantha Rechinger 1908	183
Hoya chlorantha Rechinger W 3111	184
Hoya minibella Cultivation	185
Hoya sp. W 8232	186
Hoya sp. W 3110	187
Hoya acuta Haworth 1821 green	188
Hoya sp acuta new TG	189
Hoya fetuana Kloppenburg 2003 W 2865	190
Hoya seanwhistleriana Klopp.2015	191
Hoya med flow Sulawesi	192
Hoya odorata ssp. taytayanensis Kl. 2015	194
Hoya rigida Kerr 1939	195
Hoya sp. shephardell	197
Hoya sp. 80-03 Borneo	198
Hoya sp. PNH 1268	199
Hoya cf. fetuana Kloppenburg 2003	200
Hoya campanulata Blume 1826	201
Hoya shephardii Short ex Hooker 1861	202
Hoya cumingiana ssp. rezalensis K et al	203
Hoya sp. Matafoao Ridge Am. Samoa,	204
Hoya cf. amoena T Green	205
Hoya sp. USDA 354238	206
Hoya finlaysonii Wight 1834	207
Hoya sp. laurifolia	208
Hoya cumingiana ssp. biloba Klop, Mend	209
Hoya whistlerii Kloppenburg 2002	210
Hoya sp NS05-162	211
Hoya recurvula sub. bokorensis Klopp. & Yap	212

Hoya meredithii x crassicaulis	213
Hoya sp. CAHUP 61933	214
Hoya sp. Sabah, Malaysia	215
Hoya caudata Hooker f. 1883	216
Hoya odorata Schlechter 1906 UC 13176	217
Hoya sp. PNG #4	218
Hoya limonica S. Moore 1921	219
Hoya obovata Decaisne 1844	220
Hoya diversifolia ssp chlorina Klopp. et.	221
Hoya subquintuplinervis Miquel 1869	222
Hoya mindorensis ssp. recurvula K. et al	223
Hoya mindorensis ssp. horizontala K. et al	224
Hoya ubudensis Klopp. & Yap	225
Hoya monetteae Green 2004	227
Hoya samoensis Seemann 1866 W1237	228
Hoya samoensis Seemann W 1506	229
Hoya mindorensis ssp. cremea K & M	230
Hoya cumingiana ssp. flosviridia K et al	231
Hoya wibergiae Kloppenburg 2001	232
Hoya wibergiae ssp alba Klopp. 2015	233
Hoya sp. PNH 14203	234
Hoya betchei (Schltr.) Whistler W 344	236
Hoya kerrii Craib 1911 Thai White	235
Hoya mindorensis ssp. kanagongensis K.	237
Hoya recurvula Kloppenburg 2000	238
Hoya kerrii Craib 1911	239
Hoya sp. IPPS 7020	240
Hoya sp. ABG #12 NG	241
Hoya mindorensis ssp. altransa K. et al	242
Hoya mindorensis ssp. waymaniae K. et	243
Hoya bandongii Klopp. & Ferreras 2011	244
Hoya mindorensis ssp. duoa K et al	245
Hoya benitotanii Klopp. & Siar 2011	246
Hoya sp. Ben Vergara unk #56	247
Hoya juannguoana Kloppenburg	248
Hoya estrellaensis Green & Klopp. 2010	249
Hoya sp. DAV 819 (cominsii)	250
Mt. Matavai, Samoa Green (West)	251
Hoya sp. Sulawesi med. flower	252
Hoya erythrina Rintz 1978	253
Hoya erythrostemma Kerr 1939	254
Hoya tannaensis Green & Klopp.2011	255
Hoya sp. UC 3949	256
Hoya mindorensis ssp. quezonensis K et	257
Hoya mindorensis ssp. globosa K. et al	258
Hoya mindorensis sup. Tingkoyanensis	

Kloppenburg, Mendoza	259
Hoya nagtabonensis Kloppenburg 2013	261
Hoya diversifolia Blume 1826	262
Hoya vitellina Blume 1849	263
Hoya citrina Ridley 1922	264
Hoya neobudica Guillaumin 1937	265
Hoya sp. Samoa double	267
Hoya sp. W 8798 ? H. whistlerii	268
Hoya sp. Loher s.n. (UC) 1915	269
Hoya lucyae Kloppenburg & Siar 2006	270
Hoya matavanuensis Kloppenburg 2011	271
Hoya tiatuilaensis Kloppenburg 2013	272
Hoya smithii Kloppenburg 2010	273
Hoya sp. W 7989 H. whistlerii ?	274
Hoya mindorensis ssp. luzonensis K et al	275
Hoya sp. W9539	276
Hoya sp. Greeter & Wagner Jr. UC #3949	277
Hoya sp. 577	278
Hoya sp. mitrata Cream 2003	279
Hoya deykei Green 1999	280
Hoya plicata King & Gamble 1908	281
Hoya Tioman Is., Malaysia TG	283
Hoya sp. Buluson Astrid Bostram Sweden	284
Hoya longifolia Wallich ex Wight 1834	285
Hoya mindorensis ssp squama K et al	286
Hoya golamcoiana Kloppenburg 1991	287
Hoya querinoensis Klopp et al	288
Hoya sp. CAHUP 18680	289
Hoya sp. Ramos & Edano (UC) 49328	290
Hoya ramosii Klopp. & Siar 2007	291
Hoya shephardii Short ex Hooker	293
Hoya mindorensis ssp. gelba Klopp et al	295
Hoya benguetensis Schlechter 1906	296
Hoya cominsii Hemsley 1890 IML 457	297
Hoya bicolor Kloppenburg 2000	298
Hoya purificacioniae K & Siar plant lost	299
Hoya sp. USDA 354241	300
Hoya sp. IML 557 as gracilis	301
Hoya kerrii Craib 1911 hairy	302
Hoya betchei (Schltr.) Whistler 1978	303
Hoya mindorensis ssp. nagtabonensis K et	304
Hoya savauensis Klopp. & Whist.2011	305
Hoya surigaoensis K, Siar. Nyhuus 2010	306
Hoya mindorensis ssp. lawawanensis K et	308
Hoya edwinofernandoi K, et al 2015	309
Hoya sp. W 7605	310

Hoya sp. PNH 7889	311
Hoya crassicaulis Elmer ex Klopp. 1995	312
Hoya diversifolia Blume 1826	313
Hoya hainanensis Merrill 1929	314
Hoya pauciflora Wight 1848	316
Hoya sp. Nagtabon, Palawan 1995	317
Hoya annacajanoae Klopp. & Siar 2008	318
Hoya diversifolia ssp. elnidicus K. 1991	319
Hoya finlaysonii Wight 1834	320
Clone from Kim Yap, Singapore 2003	322
Hoya sp. marginata	323
Hoya telosmoides Olmar	324
Hoya mindorensis ssp. lagunaensis K et al	325
Hoya uncinata Teijsm. & Binn. 1863	326
Hoya amoena ssp. bogorensis Green 2014	328
Hoya cardiophylla Merrill 1920 190302 DH	329
Hoya vitellinioides Brink f. 1950	330
Hoya mindorensis ssp. nuevaensis K et al	332
Hoya sp. (UC) Here 1013 Colon	333
Hoya benvergarae Klopp. & Siar	334
Hoya mindorensis Schlechter 1906	335
Hoya graveolens Kerr 1939	336
Hoya sp. W 10007 as diptera	337
Hoya sp. W 1106 as filiformis	338
Hoya lamingtoniana Bailey 1898 (not)	339
Hoya isabelaensis K. S & Ferreras 2011	340
Hoya soligamiana Klopp. & Siar 2009	341
Hoya sp. UC 295 merrillii ?	342
Hoya lanceolata Wallich ex Don 1825	343
Hoya mindorensis ssp. rosea Klopp et al	344
Hoya hamiltoniana lamb et al	345
Hoya gigantangensis Kloppenburg 1992	346
Hoya sp. W 10339	347
Hoya lambii Green 2000	348
Hoya xxxx Cebu as merrillii	349
Hoya pentaphlebia Merrill 1918	350
Hoya cagayanensis Burton 1987	351
Hoya isabelaensis Klop. Mend.& Ferr 2011	352
Hoya odorata Schlechter CAHUP 19258	353
Hoya butleriana K, S, G, & C 2013	354
Hoya mindorensis ssp. tacta K, C, & G	355
Hoya mindorensis ssp. mendozae Klop. et	356
Hoya mindorensis ssp. condupla K et al.	357
Hoya mindorensis ssp. hirsute K et al	358
Hoya aurigueana ssp. altocolora K et al	359
Hoya landgrantensis Kloppenburg 2009	360

Hoya coronaplana Klop et al.	361
Hoya cumingiana ssp. kamangongensis	362
Hoya marsianii Klopp et al	363
Hoya mindorensis ssp. bakerensis K. et al	365
Hoya mindorensis ssp. ligulasepala K et al	366
Hoya purificacioniae Klop. & Siar 2014	367
Hoya mindorensis ssp. lagyoensis K et al	368
Hoya samoensis W1297	369
Hoya landgrantensis ssp. siniloanensis	370
Hoya blashernaezii ssp. bigaensis K et al	372
Hoya Ben's yellow variant	373
Hoya coronaplana ssp. bakyaanensis	374
Hoya mucronulata Warburg 1907	375
Hoya ranauensis T. Green & Klopp. 2014	376
Hoya siniloanensis Klopp. et al	377
Hoya sp. Mt. Gallego, Guadalcanal	378
Hoya sp. CAHUP 5970	379
Hoya sp. Maximo Wayet	380
Hoya marionii Klopp, Mendoza	381
Hoya tauensis Kloppenburg 2009	382
Hoya quezonensis Klopp. Mendoza et al	383
Hoya litii Kloppenburg & Cajano 2016	384
Hoya perangensis Klopp. & Siar	385
Hoya sp. as rumphii TG	386
Hoya lanoto'oensis Kloppenburg 2015	387
Hoya meridithii Green 1989	388
Hoya crassicaulis Elmer ex Klopp. 1995	389
Hoya mindorensis ssp. mabilogensis K et	390
Hoya incrassata 900129	391
Hoya cystiantha Schlechter 1913	392
Hoya wayetii Kloppenburg 1993	393
Hoya maxima (Karst.) Warburg 1907	394
Hoya sp.910301	395
Hoya cf. fitchii Vail 20	396
Hoya sp. Edano (PNH) 14203 1951	397
Hoya teodymendozae Klopp & Mend et al	398
Hoya valmoriaana K, Guevarra & Car. 2013	399
Hoya williamoliveriana Klop. & Caj. 2016	400
Hoya waymaniae Kloppenburg 1995	401
Hoya sp. CAHUP 3935, Hernaez	402
Hoya sulit # 10147 PNH	403
Hoya crassicaulis Elmer ex Klopp. 1995	404
Hoya merrillii CAHUP 5297	405
Hoya palawanensis ssp. major Klopp. 15	406
Hoya makatongensis Klopp., Mend et al	407
Hoya marlowei ssp. infantaensis K et al	408

Hoya sp. W 2705 as filiformis	409
Hoya benvergarai Klopp & Siar 2008	410
Hoya benvergarai ssp. gelba Klopp et al	411
Hoya linapauliana Klopp. et al	412
Hoya linapauliana ssp. verida Klopp et al	413
Hoya linapauliana ssp. nakarensis K et al	414
Hoya mindorensis ssp. siniloanensis K et	415
Hoya marlowei Klopp.Mend. et al	416
Hoya clemensiorum Green 2001	417
Hoya sp. merrillii 900307 JP	418
Hoya palawanensis Klopp. et al	419
Hoya palawanensis ssp. minor Klopp	420
Hoya sp. as H. filiformis	421
Hoya tamaleanae Kloppenburg 2008	422
Hoya sp. w 7605	423
Hoya sp. PNH 5733	424
Hoya sp. Long Miau TG 1405	425
Hoya sp. 2012-4-029	426
Hoya marvinii Klopp. et al	427
Hoya sp. 900355	428
Hoya sp. Poring Hot Springs, Saba TG	429
Hoya bicknellii Kloppenburg 1999	430
Hoya cajanoae Kloppenburg	431
Hoya aurigueana K, S, C & C 2013	432
Hoya mindorensis ssp. granulata K et al	433
Hoya lavacensis Klopp. Guev. & Carand	434
Hoya lagunaensis Kloppenburg 2014	435
Hoya cagayanensis Burton 1987 UC 45730	436
Hoya incrassata Warburg 1904	437
Hoya persicina ssp. triplexa K. & Mend	438
Hoya forbesii King & Gamble 1903	439
Hoya kanyakumariana Henry 1978	440
Hoya auripigmenta Klopp, Mend et al	441
Hoya blashernaezii ssp..... K & Cajano	442
Hoya benstoneana K. S, M, G & C 2013	443
Hoya chiekoae K, F & Mend. 2012	444
Hoya corollanerva Klopp. Mend. et al	445
Hoya ilagiorum Klopp. & Siar 2010	446
Hoya myrmecopa ssp. kapatalanensis K .	447
Hoya marizae Klopp. Mend. et al	448
Hoya persicina K, S,M, G, & C 2013	450
Hoya persicina ssp. rosea K et al	451
Hoya mindorensis ssp. corollastriata K et	452
Hoya crassicaulis ssp. mendozai Klopp. et	453
Hoya persicina ssp. lalawanensis K et	454
Hoya foxii Kloppenburg 2014	455

Hoya persicina ssp. inawaensis K et al	456
Hoya crassicaulis Elmer ex Klopp.1995	457
Hoya auripigmenta ssp. papillata K et	458
Hoya cardiophylla Merrill 1920	459
Hoya velasioii ssp. grandiora 18682	460
Hoya kentiana Burton 1991 Perpich 428	461
Hoya obtusta Klopp. Mend, et al	462
Hoya marlowii Klopp. Mend unp	463
Hoya marlowii ssp. polilloensis K et al	464
Hoya bicolor ssp. polilloensis K et al	465
Hoya sp. CAHUP 5268 obscura	466
Hoya sp. NS0009	467
Hoya sp. NH #1 (Vanuatu).	468
Hoya tamayensis Klopp., Mend et al	469
Hoya mindorensis ssp. corollastriata K et	470
Hoya sp. IML 1056	471
Hoya alwitriana K, S. G. & C 2012	472
Hoya aurantiaca K., Siar & Cajano 2009	473
Hoya aurantiaca ssp. armenia K et al	474
Hoya lucbanensis ssp. papillata K et al	475
Hoya sp. W 3961 as filiformis	476
Hoya bakyaanensis Klopp, Mend et al	477
Hoya blashernaezii Kloppenburg 1999	478
Hoya penta Klopp. Mend at al	479
Hoya solaniflora Schlechter 1913	480
Hoya kastbergii Kloppenburg 2003	481
Hoya sp. EG 06097	482
Hoya catanduanensis K, Mend, et al	483
Hoya latifolia ?	484
Hoya micrantha Hooker f. 1883	485
Hoya armeniaca Klopp, Mend et al	487
Hoya rizaliana Kloppenburg 1999	488
Hoya burtoniae Kloppenburg 1990	489
Hoya davidgoyderiae Klopp. Mend. et al	491
Hoya fitchii Kloppenburg 2009	492
Hoya lucbanensis K et al	493
Hoya lucardenasiana K,S & Cajano	494
Hoya liljebjorniana Klopp. & Cajano 2016	495
Hoya polilloensis K. G, M et al 2013	496
Hoya rhodostella Ridley 1923	497
Hoya sp. PNH 11859	498
Hoya imbricata Decaisne 1844 mottled	499
Hoya velasioii Kloppenburg 2015	500
Hoya ralphdavisiae K. Mend. & Ferr. 2014	501
Hoya blashernaezii ssp maragondonensis	502
Hoya opposita G. Dom 1837	503

Hoya espaldoniana Klopp. & Siar 2014	504
Hoya anncajanoae ssp. lagyoensis K et al	505
Hoya vicencionana ssp. quezonensis 2015	506
Hoya sp. NS05-206	507
Hoya sp. quinquinervia CAHUP 63827	508
Hoya gelba K, Guev & Car. 1013	509
Hoya blashernaezii ssp. ferreriana K,	510
Hoya kanalaonensis K, S, Ferreras 2010	511
Hoya katherinechallisiana K, M et al	512
Hoya myrmecopa Kleijn & Donk.1999	513
Hoya persicina ssp. tagumpayensis K et	514
Hoya persicina ssp. tinkoyanensis K et	515
Hoya pimenteliana Kloppenburg 1999	516
Hoya sp. Ramos & Edano (UC) 49395	517
Hoya quinquinervia 81100	518
Hoya blashernaezii ssp. tinkoyanensis	519
Hoya vicencionana K, S, G, &C 2013	520
Hoya sp. NS00-004	521
Hoya blashernaezii ssp. recurvula AC #2	522
Hoya blashernaezii ssp. straminea K et al	523
Hoya eburnean K, G & C 2013	524
Hoya cremora Klopp. Mend, et al	525
Hoya faoensis Klopp. & Siar 2008	526
Hoya sp. CAHUP 5967 incrassata	527
Hoya obscura Elmer ex Burton 1986	528
Hoya sp. Edano/Gutierrez (PNH) 37800	529
Hoya sp. Edano (PNH) 349 1947	530
Hoya nuevaensis Klopp. & Mend.	531
Hoya retusa Dalzell 1852	532
Hoya sp. PNH 4854	533
Hoya affina Klopp, Mend, et al	534
Hoya sp. PNH 4936 Gaerlan & Fuentes	535
Hoya inawaensis Klopp. Mend. et al	536
Hoya heuschkeliana subsp. anncajanoae	537
Hoya bordenii Schlechter 1906(UC)15829	538
Hoya mcgregorii PNH 15541	539
Hoya inconspicua Hemsley 1894	540
Hoya sp. W8508	542
Hoya blashernaezii ssp. carnea Kl. & Caj.	543
Hoya nuuuliensis Klopp. & Siar 2008	544
Hoya renuncula Klopp. Mend et al	545
Hoya indentata Klopp, mend. et al	546
Hoya markoi Klopp. mend. et al	547
Hoya blashernaezii ssp. eudaimononia	548
Hoya sp. PNH 11591	549
Hoya blashernaezii ssp. inawaensis K et	550

Hoya blashernaezii ssp. infantaensis K.	551
Hoya blashernaezii ssp. lagyoensis K et al	552
Hoya blashernaezii ssp. stramiea K et al	553
Hoya blashernaezii ssp. tangerina K et al	554
Hoya blashernaezii ssp. truncate K et al	555
Hoya blashernaezii ssp. lalawinanensis	556
Hoya blashernaezii ssp. grandiora K et al	557
Hoya sp. affinis australis #941135	558
Hoya scortechinii King & Gamble 1908	559
Hoya odorata PNH 18041	560
Hoya querinoensis Klopp. & Siar 2007	561
Hoya histora Kloppenburg 2015	563
Hoya blashernaezii ssp. nuevavizcayensis	564
Hoya blashernaezii ssp. aurantiaca	565
Hoya afuangae Klopp. & Cajano	566
Hoya lagyaensis Kloppenburg & Mendoza	567
Hoya polystachya Blume 1849	568
Hoya moninae Klopp.. & Cajano 2014	569
Hoya mamagongensis Klopp. Mend. et al	570
Hoya ferrerassii Klopp. & Siar 2010	571
Hoya tagumpayensis Klopp. Mend, et al	572
Hoya wayetii ssp. lagyoensis K. M et al	573
Hoya blashernaezii ssp. siariae Klo. 2002	574
Hoya kamangongensis Klop. Mend et al	575
Hoya littoralis Schlechter 1905 IML 708	576
Hoya verticillata (Vahl) Don 1804	577
Hoya blashernaezii ssp. vadacorolla K et	578
Hoya ignota Klopp. Siar, Cajano, et al	579
Hoya eburna ssp. infantaensis K et al	580
Hoya sp. CAHUP 5269	581
Hoya columna Klopp 2014 CAHUP 41193	582
Hoya sulu-anensis Klopp, Mend, et al	583
Hoya sp. CAHUP 63826	584
Hoya ignota Klopp. Siar & Cajano	585
Hoya lasiantha Korthals ex Blume 1848	586
Hoya maximowayetii Klopp. 2014	587
Hoya nummularioides Constantin 1912	588
Hoya panayensis Klopp. & Siar 2009	589
Hoya sp. CAHUP 5270	590
Hoya sp. CHAUP 5293 & 5392	591
Hoya sp. PNH 39370 Quisimbing 1957	592
Hoya sp. W 2643 filiformis	595
Hoya sp. CAHUP 41945	593
Hoya sp NS 005	594
Hoya mata-ole-afiensis Kloppenburg 2015	595

Hoya blashernaezii ssp. mendozai K et al	596
Hoya lacunosa Blume 1826	597
Hoya breviaolata Kleijn & Donkelaar 2001	598
Hoya stafeensis Klopp, Mend, et al	599
Hoya coronarosea Klopp, Mend unp	600
Hoya lambioae K, G, C & C 2013	601
Hoya multisepala Klopp. Mend., et al	602
Hoya rima Klopp. mend et al	603
Hoya blashernaezii ssp. armerina K et al	604
Hoya sp. IPPS 8860	605
Hoya tomatensis Green & Klopp 2004	606
Hoya blashernaezii ssp. kamgongensis	607
Hoya sp. UC 424	608
Hoya spartioides (Kuntz) Klopp. 2001	609
Hoya blashernaezii ssp. nagcarlanensis	610
Hoya blashernaezii ssp. parviora K, et al	611
Hoya blashernaezii ssp. taywanisensis K.	612
Hoya sipitangensis Klopp. & Wiberg 2002	613
Hoya burtoniae Kloppenburg 1990	614
Hoya poolei White & Francis 1928	615
Hoya lacunosa Blume 1826 var. pallida	616
Hoya geotropa Klopp. Mend. et al	617
Hoya papaschonii Rodda 2014	618
Hoya blashernaezii ssp. karencaseae K.	619
Hoya blashernaezii ssp. simeonae K. et al	620
Hoya blashernaezii ssp. marizae K et al	622
Hoya concava Klopp. Siar et al 2014	623
Hoya apoensis var. sagittaria K, S, F 2010	624
Hoya bebsguevarrae Klopp. et al 2013	625
Hoya bicolensis Klo. Siar, Ferr. Men. 2012	626
Hoya mitisa Klopp. Mend. et al	627
Hoya carmelae K,S, Ferreras 2010	628
Hoya eburna ssp. rosea Klopp. Mend. et al	630
Hoya eitapensis Schlechter 1909	632
Hoya ginabrigidana Klopp, et al	633
Hoya crassicaulis Kloppenburg	634
Hoya polystachya alba	635
Hoya parviflora Wight 1834	636
Hoya pseudolittoralis Norman 1937	637
Hoya pseudoleyensis ssp. majora K. et al	638
Hoya davidcummingii Klopp. 1995	639
Hoya salmonea Kloppenburg 2013	640
Hoya salmonea ssp. pallida k et al 2013	641
Hoya foliapalmata Klopp. & Mendoza	642
Hoya blashernaezii ssp. luzonensis K et al	644
Hoya corazoniae K, S, Ferreras 2010	645

Hoya heuschkeliana ssp. mendozai Klop.	646
Hoya setsukokobayashiae Klopp. et al	647
Hoya tsangii Burton 1991	648
Hoya krohniana Kloppenburg & Siar 2009	649
Hoya sp. as brittonii	650
Hoya navicula Klopp. Mend, et al	651
Hoya nummularioides pink clone	652
Hoya krohniana ssp. lalawinanensis K.	653
Hoya auroraensis Klopp. Mend et al	654
Hoya samarensis Klopp. & Siar 2011	655
Hoya coronarubra Klopp. Mend. et al	656
Hoya apoensis Klopp. & Siar 2010	657
Hoya diptera Seemann 1861	658
Hoya latifolia G. Don (mac. alba)	659
Hoya odetteae Kloppenburg 1998	660
Hoya duezona Klopp. Mend. et al	661
Hoya pseudoleytenis Kloppenburg 2013	662
Hoya blashernaezii ssp. cajanoae Klopp.	663
Hoya marquisii Klopp et al	664
Hoya acanthocitrina Klopp. Mend. et al	665
Hoya capatata Klopp. Mend. et al	666
Hoya biespada Klopp. Mend. et al	667
Hoya heuschkeliana ssp. marionii 2014.	668
Hoya sp. IML 850 affinis	669
Hoya camphorifolia Warburg 1904	670
Hoya sp. Lisa V-2	671
Hoya realensis Klopp. Mend. et al	672
Hoya tangerina Klop. Mend & Ferr. 2014	673
Hoya heuschkeliana Kloppenburg 1989	674
Hoya loheri ssp. tanawanensis K & M	676
Hoya memoria Kloppenburg 2004	677
Hoya williamsiana ssp. calendulina K et	678
Hoya walliniana Klopp. & Nyhuus 2004	679
Hoya bifunda ssp. integra K, S, et al 2013	680
Hoya sp. IML 232 Kuching ,Borneo	681
Hoya pallilimba Kleijn & Donkelaar 1999	682
Hoya nyhuusiae Kloppenburg 2003	683
Hoya bifunda ssp. obtusa K, M et al	684
Hoya sp. IPPS 8870	685
Hoya subrosea Klopp. Mend et al	686
Hoya aurora ssp. nagcarlanensis K et al	687
Hoya cyclaminea Klopp, Mend at al	688
Hoya nabawanensis Klop.& Wiberg 2002	689
Hoya pinnata Klopp Mend. et al	690
Hoya barbonii Kloppenburg 2014	691
Hoya lagunaensis Klopp. Mend. et al	692

Hoya sp. CAHUP 9035	693
Hoya sp. TG Bada Valley	694
Hoya trista Klopp. Mend. et al	695
Hoya viscayaensis Klopp. Mend. et al	696
Hoya celsa K, S, G & C 2013	697
Hoya nakarensis Klopp. Mend. et al	698
Hoya bakerensis Klopp. Mend. et al	699
Hoya rosarioae ssp. Klopp. & Siar 2010	700
Hoya rosarioae aff MR	701
Hoya sp. F484 Kuching, Borneo	703
Hoya sp. TN 99-002	704
Hoya unica Klop., Mend., & Ferr. 2013	705
Hoya unica ssp. aurantiaca K. M. et al	706
Hoya albida Klop., Siar, & Cajano 2011	707
Hoya maubanensis Klopp. Mend. Et al	708
Hoya marananiae Klopp. & Siar 2015	709
Hoya nakarensis ssp. cadmia K. M. et al	710
Hoya lagyoensis Klopp. Mend. et al	711
Hoya nuevaensis Klopp. Mend. et al	712
Hoya revoluta Wight 1883	713
Hoya yapiana Kloppenburg 2010	714
Hoya sp. IPPS 1779	715
Hoya aurea Klopp. Mend. et al	716
Hoya leticiae Kloppenburg & Cajano 2016	717
Hoya unruhiana ssp. nabawanensis	719
Hoya martinii ssp. daraitonensis K, M	720
Hoya marvinii K et al	721
Hoya martini Klopp. Mend. et al	722
Hoya unruh. ssp. maubanensis K, M	723
Hoya acanthodissimila Klopp. Cajan & Bar.	724
Hoya sp. UC s.n. Taylor	725
Hoya unruhiana K, S, G & C 2013	726
Hoya subrosea ssp. inawaensis K et al	727
Hoya acanthomindora Kl. Men. & F 2013	728
Hoya acanthotruncata Klopp. Mend. et al	729
Hoya bifunda K, S, G & C 2013	730
Hoya cupula Klopp., Mend. & Ferr. 2013	731
Hoya engleriana Hosseus 1907	732
Hoya taeahwa ssp. tayuncisensis K et al	733
Hoya nagcarlanensis Klopp. Mend. et al	734
Hoya taeahwa Klopp. Mend. et al	735
Hoya caespitosa Klopp. Mend. et al	736
Hoya bulba Klopp. Mend. et al	737
Hoya capotoanensis Kloppenburg 2014	738
Hoya capot. ssp. quezonensis Klop & Men	739
Hoya liquida Klopp. Mend. et al	740

Hoya linguiforma Klopp. Mend. et al	741
Hoya acanthopenta Klopp. Mend. et al	742
Hoya caradangiana Klopp. & Siar	743
Hoya culpa Klopp. Mend. et al	745
Hoya rosarioae ssp. realensis K. M. et al	746
Hoya unica ssp. bakerensis K. Mend. et al	747
Hoya pubacupula Klopp. Mend. et al	748
Hoya bilobata Schlechter 1908 ?	749
Hoya bilobata Schlechter 1908 TG-BH	750
Hoya bilobata Monina #1UP Landgrant	751
Hoya bilobata	752
Hoya leytensis Elmer ex Burton IML 228	753
Hoya linearis Wallich 1905	754
Hoya brittonii Kloppenburg 1992	755
Hoya picta Miquel 1856 Dr. Schlechter's	756
Hoya amorosoae T Green & Klopp. 2014	757
Hoya williamsoniana K. S. M. G. & C 2013	758
Hoya bilobata Monina #2	759
Hoya minuta Klopp. Mend. et al	760
Hoya sp. DS #1	761
Hoya sp. W 3252	762
Hoya tinkoyanensis Klopp. & Mend.	763
Hoya kannana Klopp. Mend. et al	764
Hoya minimapollinaria Klopp. Mend. et al	765
Hoya minipollinia Klopp. & Cajano	766
Hoya reysisii Medina & Kloppenburg 2016	767
Hoya parvapollinia Klopp. Mend. et al	768
Dr. Schlechter's sheet data	
Additional Data	777
Appendix	788

Bold indicates type material.

Introduction

As with previous publications of mine, I hope the material and data herein contained will form the basis for a better appreciation of the *Hoya pollinaria* as a taxonomic tool. My first motivation in the direction came from Hooker's profound observation of the stability of pollen masses while working with dried material (herbarium sheets). Secondly, adverse criticism of Dr. Rintz's emphasis on the past

neglect of “twin-pollinia” as a taxonomic character, spurred me on to further critical in-depth study.

Dr. Schlechter drew floral parts on most of his *Hoya* herbarium sheets. Drawings of the pollinarium were also included. Although these representations are small and lacking in many details, they are none-the-less valuable in re-identifying his species as their relative proportions are still of value. Even in his descriptions, such comments as “retinaculum very small” are significant in a taxonomic sense. The most detailed drawings of *Hoya* pollinarium have been those of David Kleijn of the Netherlands. David Liddle in Australian publications has also made detailed drawings of Pollinarium. I have one objection to the positioning of the Retinaculum above the two pollinia by these two authors and by Dr. Rintz. To me it is like not using the top of a map to represent north. The pollinarium in *Hoya* is upright, i.e. the retinaculum is secreted by the fused stigmas and the pollinia are inward toward the center of the flower. For me, Schlechter had it correct!

I have discussed under “Materials and Methods” some of the difficulties in photographing these very small structures. There is a loss of resolution and detail at every step of the process in bringing this work to publication. I suppose we all wish for more money, better equipment, and above all more time. The expenses and time of all this work is borne by me personally. Many thousands of negatives and pictures have been filed and labeled. These form the data base for this and further studies. I feel a photographic record is invaluable, since at any time I can refer back to the actual photo. I continually re-photograph species so I am able to study any variations occurring over time. In addition, clones bloomed in many locations are added to the photographic and data record on a continuing basis, along with drawings and critical measurements. With the advent of computers it is easy to make necessary corrections and additions to a data base and to then from time to time release updated publications.

Acknowledgments

The development and writing of this book required the help of a large number of people. Probably the most important are all those who took time to send me flowers and cuttings. In addition constructive comments have been invaluable in furthering this work. Flowers have been used in my photographic data base of *hoya* species. For flowers I thank Ann Wayman (AW), Oregon; Ted Green (TG), Hawaii; Chanin Thorut (CT), Thailand; Michael Miyashiro (MW), Hawaii; Jerry Williams (JW), Vista CA; David Bicknell (DB) Cebu, Philippines; Maximo Wayet (MW), Baguio, Philippines and Torill Nyhuus, (TN), Sweden. The above have also provided innumerable cuttings. In addition cuttings have been supplied by Dexter Heuschkel (DH), the late Professor Juan Pancho (JP), Maximo Wayet (MW), Blass Hernaez from the Philippines, the late Peter Tsang (PT) of Australia, Ruurd van Donkelaar of the Netherlands, Iris and David Liddle of

Australia, and the late Geoff Dennis of the Solomon Islands. I have also been helped by Chuck Everson, Vista, CA. and John Scoville, San Jose, CA. and many others.

I also wish to recognize Dr. Domingo Madulid of the National Herbarium (PNH) in Manila, Philippines, Dr. Johanis Moge of the Herbarium at Bogor (BO), Indonesia, and to the entire herbarium staff (most especially to Dr. Barbara Ertter) at the University of California Berkeley, (UC) California, USA. Indirectly thanks also to the staff of the Herbarium at University of the Philippines (CAHUP) and to the Forestry Herbarium both at Los Banos, Laguna, Philippines. I do not forget the directive help supplied by Dr. Veldkamp of the Rijksherbarium at Leiden, (L) The Netherlands. I will always be indebted to the late Dr. Benjamin Stone for his unselfish devotion to education and help whenever called upon.

Dale Kloppenburg

Materials and Methods

pollinaria
retinacula

Pollinaria of the Hoya flower are very small but the five dark brown colored are readily visible in the crown of the hoya flower without the aid of magnification. In working to remove the pollinarium I use a “Swift” binocular microscope with 10X magnification. With the sharp end of a fine sewing needle inserted under the outer end of the retinaculum, a gentle lift will usually release the entire structure intact (I now use the end of a hypodermic needle). Those removed are placed on a slide with a 1 mm imbedded graduated scale, as a measuring device, divided into microns (100 parts). The slide is wetted with a drop of Kew solution (Alcohol, glycerin, water, and formaldehyde). The removed pollinaria are easily transfer to the wetted area. Most pollinarium can be examined at thirty power or above. At around 30-40 magnifications the pollinarium are easy to focus since the field depth is relatively small. An overall view is good at these magnifications.

I have found that a magnification of 100 power is best for detailed study of most hoya pollinarium. For this I use a Bausch & Lomb monocular scope. It is provided with a EW 10 XD/20.50 -14.5 mm eyepiece. The 10x lens is 0.25. By the time the pollinarium is in good general focus in a SLR camera the magnification with this lens combination is approximately 160X (actually it is slightly more than 162) (now use a digital camera, no adaptor needed). My camera is provided with a microscope adapter, which allows me to switch from the Swift binocular scope (for extraction) to the monocular for measurements and photography. The camera mounts on the eyepiece, and the SLR feature allows visual focusing through the microscopes lens system.

Problems encountered: At near 100X magnification even though the pollinarium is a small object (we are dealing with fractions of a millimeter) the depth through which you must focus becomes greater (the depth of field is shallower). This requires a number of photos at various focal planes to record all the features. Thus presentations must be of a number of photos or composites. The retinaculum is especially deep i.e. three dimensional and thick, especially at the head and central portion. The photos (copies) in the data pages are a best average photo depiction of the structure or a composite in a few cases. At 165 magnifications some pollinarium are too large to fit within the view area and thus must be a composite of at least two photographs.

Problem areas in addition to the above are:

- (1) When removing pollinarium, both pollinia do not always stay adhered to the caudicle. In some instances neither of the two pollinia may remain attached. The longer the flower is open the more this becomes true.
- (2) Occasionally, especially from herbarium material, the pollinia may be withered (not the general situation). Preserved dry flowers must be thoroughly soaked in Kew solution (or boiled) before removal is practical.

- (3) Destruction of the pollinia (since it represents high protein) by bupestids or other insects is occasionally encountered.
- (4) A few pollinarium, especially very large ones, have a tendency to lie at a 45° angle to the surface of the slide when still attached to the caudicle, so to measure their true width, they must be separated from the caudicle and then maneuvered to lay flat.
- (5) One must work quickly since the heat from a strong light source will start to deform (wither) the pollinia even when in the Kew solution on a slide.
- (6) Upon extraction from the anthers the pollinia and retinaculum often twist and turn. This is especially true of translators located well down the retinacular column. It becomes a real challenge to get them to lie in their original configuration, and flat on the slide. Long retinaculum with the translators attached well down on the column tend to raise their head (the inner apex) above the slide surface, adding to the depth of the focal plane. This adds to the difficulty of getting a single clear photo of the structure. In some cases the twisting is almost impossible to undo. Drying the slide is an aid and using two needles for manipulation helps. The pollinarium of course can be studied from the top (normal positioning) or turned on its back and studied from the bottom.

I have been using 100 ASA color film or recently 200 ASA speed color film. The faster speed film cuts down on the exposure time (and thus camera battery renewal). I at first used the auto exposure meter of the camera but learned that most photos were overexposed (more true for floral parts than of the pollinarium through the monocular scope). With a tensor lamp directly below the stage, directed up through the field it takes only a fraction of a second for full exposure, possibly 1-2 seconds. I now use the bulb camera setting. Photos show more and clearer detail than the photocopies or scanned images presented here but are too expensive to use in this presentation.

Pollinarium Formation

The pollen of the hoyia species I have examined are coalesced into gelatinous masses. (It is not powdery). Each mass is covered with a continuous clear, rather tough membrane. The containing receptacle is a pocket (at first an closed envelope) in the side of the triangular membranaceous anther. This anther is fused in its central basal region above to the lower surface of the inner coronal lobes basal portion and along the edge of the stylar table between the fused stigmas. The (anther) apical triangular and lateral edges being free. The anther points inward toward (and often covers the stylar region) the center of the flower. There are two pockets in each anther's apical region arranged in a fashion, so as the upper (inner) ends are nearly touching, forming a triangle that thus follows the outline of the anther edge. The edges of the envelope are thickened and buttery yellow in color. These pockets are somewhat linear as are most pollinia. It is in these pockets that the pollinia form at a very early stage of

flower development even prior to the development of the corona. The sepals are still covering the whole floral bud and the corolla has not begun to enlarge beyond the calyx. At this stage the sepals are the most visible structure of the developing flower bud. At this early period the pollen masses are gelatinous, turgid, undifferentiated, uncolored masses; shortly developing a pale yellow color, and gradually solidifying.

The pollen masses early on are completely covered by the anther envelope and sealed within it. As development continues the pollen mass deepens in color (yellow) and differentiates into characteristic parts. Eventually the envelope separates along the outer edge freeing the enclosed pollinium, which however remain in place unless disturbed. A sterile edge of varying length differentiates along the edge of the pollinium adjacent to the inner envelope edge (its narrow side). This is the thinnest portion of the pollinium as seen in cross section. This pellucid, sterile edge differs in structure and length among the various *hoya* species. It is absent in the *Section Eriostemma* Schlechter (now Genus) species (now given Genus status 2001); very rudimentary in the *Section Rudimentalia* Kloppenburg (as exemplified by *Hoya darwinii* Loher). In most species it is well defined and readily visible under a microscope even at low power. This has been called the “germinal mouth”. One more bit of structural detail (taxonomic): The groove formed by the anther pockets two surfaces (envelope like) is not just a “V” shape. As a result of irregularities in this groove if you cut a pollinia crossways you will find irregularities in the surface of the pellucid edge (the curvature is not continuous) its development conforming to irregularities of the groove (See photos on page 11). In many cases there is a linear vacuole separating this edge and the gelatinous pollen, either partially or nearly completely. Upon germination the pollen tubes burst forth (usually) first at the inner end, the end nearest the retinaculum, of the sterile edge where a pore is present allowing honeydew to enter. Almost immediately, however the whole side splits with emerging pollen tubes.

If germination occurs near the stigmatic receptive area the whole bundle of individual elongating, translucent, colorless, pollen tubes are directed to the small stigmatic receptive area. What starts off, as a flat linear formation of pollen tubes emerging along the entire length of the sterile edge (germinal mouth) becomes a coalesced tubular shaped grouping all entering the stigmatic cavity. From here they proceed to elongate through the moist loosely differentiated tissue which leads from the receptive area to the top of the ovaries enveloped in the stylar material.

There are ten stigmas (decagynous) in *hoya* fused into pentamerous pairs (or possibly 5 stigmas with split ends). At the outer corners (edge) of the pentagonal stylar table the fused stigmas form a short barely discernible groove. This is on the upper side of the receptive area. Secretions from this grove give rise to the retinaculum. The surface of the stigma upon which the retinaculum is formed belays a raised spongy, although structurally coherent, template of the retinaculum. At a very early stage of flower development, just after the pollinia are visible as gelatinous masses, the stigma begins to secrete the retinacular structure. I have arbitrarily termed this (Stage 2). At this time the upper surface of the retinaculum begins to form. The inner apical (head) portion is continuous from secretion of the inner end (proximal) of the stigmatic grove. The two

sides of the retinaculum are at first free and bisymmetrical, forming from lateral secretions of the stigmatic groove. This upper surface eventually fuses as maturation continues. The outer ends remain free and curve slightly outward from the median line. They also curve over the edge of the fused stigmas toward the underlying receptive area. The whole structure at first is pale brown and somewhat soft then becomes horny and dark brown, becoming very rigid. Gelatinous material in a semi-structured condition at the end of the twin extensions remains un-solidified.

As the corolla formation is completed and the flower is just ready to open (anthesis) the formation of the retinaculum is complete, and the pollinia are released from the anther envelopes (stage 4). At this stage the retinaculum is a three dimensional structure with a tubular cavity in from the outer (distal) apex, the lower surface of this channel (the under side of the retinaculum) is shorter than the upper (dorsal) surface with its projected extensions. This surface may be flat or slightly rounded. This lower surface thins as it reaches its rounded outer extremities. Through the top view on a microscope it appears as a rounded end of the retinaculum (the lower surface; end furthestmost from the head). In addition to this central tube there are two side tubes, one on either side. Usually these side tubes are 45 degrees to the main axis and the central tube, but not connected to it. It is in these side tubes that the translator arms and caudicle are attached at the inner end. This allows for twisting and turning of the attached structures when the pollinarium is removed from its housing. The caudicle is attached above the translator. Both of the attached ends being tubular in shape, attached to the outer side of the wall forming the central retinacular tube.

The translators and caudicles are secreted at about the time the corolla begins to emerge from the surrounding calyx (Stage 3). They develop along the groove formed by the fused lower side of the anther, thus connecting the retinaculum to the pollinia. Each retinaculum has two translator arms and associated caudicles that connect to two pollinia each housed in (different) adjacent anthers. The clear sticky caudicle is supported by the translator. The translator is wedge shaped, conforming to the space between the anther and style, with its wider concave top supporting the caudicle. It is structurally more sound than the more fluid sticky caudicle. The latter in many cases is in the shape of a comma with the bulbous end into which the basal end of the pollinium adheres. Both of these parts of the pollinarium show individuality and differ widely among the various hoyia species. I have never observed a hoyia species lacking either structure. In some species the caudicle itself shows differentiation of its surface similar to that found in the translators, and also with some structural differentiation. The diversity presented, in the following photomicrographs, shows what a critical and important tool for taxonomic identity the pollinarium is. In herbaria material it is the one floral part that may remain intact without distortion or change. Upon soaking of the flower in the Kew solution (or boiling it up, not preferred) it can many times be removed for study intact.

At flower opening the pollinia are usually tightly affixed to the caudicle. As the flower ages this bond becomes less. In older flowers, while removing the retinaculum from a open flower, the pollinia may separate easily from the caudicle. On the following

pages I have tried to break the pollinarium development into stages and show photomicrographs related to each stage.

Dr. Rintz (The Peninsular Malaysian Species of Hoya) in The Malayan Nature Journal 30:1978, 10 divided pollinarium into four groupings. (1) Both caudicles and pollinia winged. (2) Only pollinia winged. (3) Neither caudicle nor pollinia winged, caudicles long. (Section Eriostemma now a Genus) (4) Neither caudicles nor pollinia winged, caudicles short. By winged he is referring to the sterile edge of the pollinia or the translator supporting the caudicle. I have found caudicles and translators on all the species I have photographed in his grouping (2). In addition there is a rudimentary (very short) sterile edge on the species *Hoya mitrata* Kerr (and also *Hoya darwinii* Loher), his grouping (4). Of the pollinarium I have so far examined I have yet to find any without either a translator or caudicle as I define them. I feel either Dr. Rintz was using a low powered microscope or not studying the material in detail. It appears as far as the sterile edge is concerned the Section Rudimentalia Kloppenburg species represent a near loss (or beginning) of this structure among Hoya species.

In discerning the caudicle, since in most cases it is a clear almost transparent structure, it may be necessary to check closely at different focal planes in order to detect its presence. It is in some cases below the more opaque translator and thus hidden. I have found the use of dye helpful in differentiating these complex structures and especially useful in photographing parts that are all of the same color but different consistencies.

Corona of a Hoya Flower

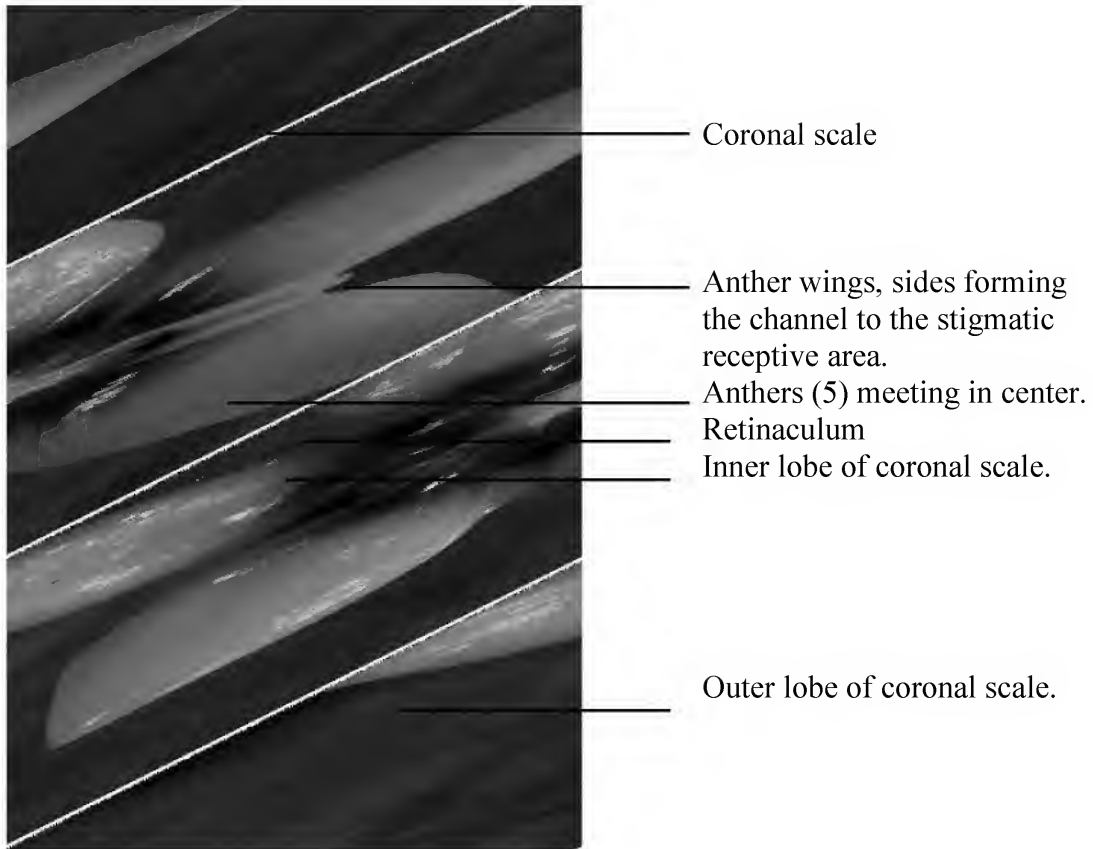
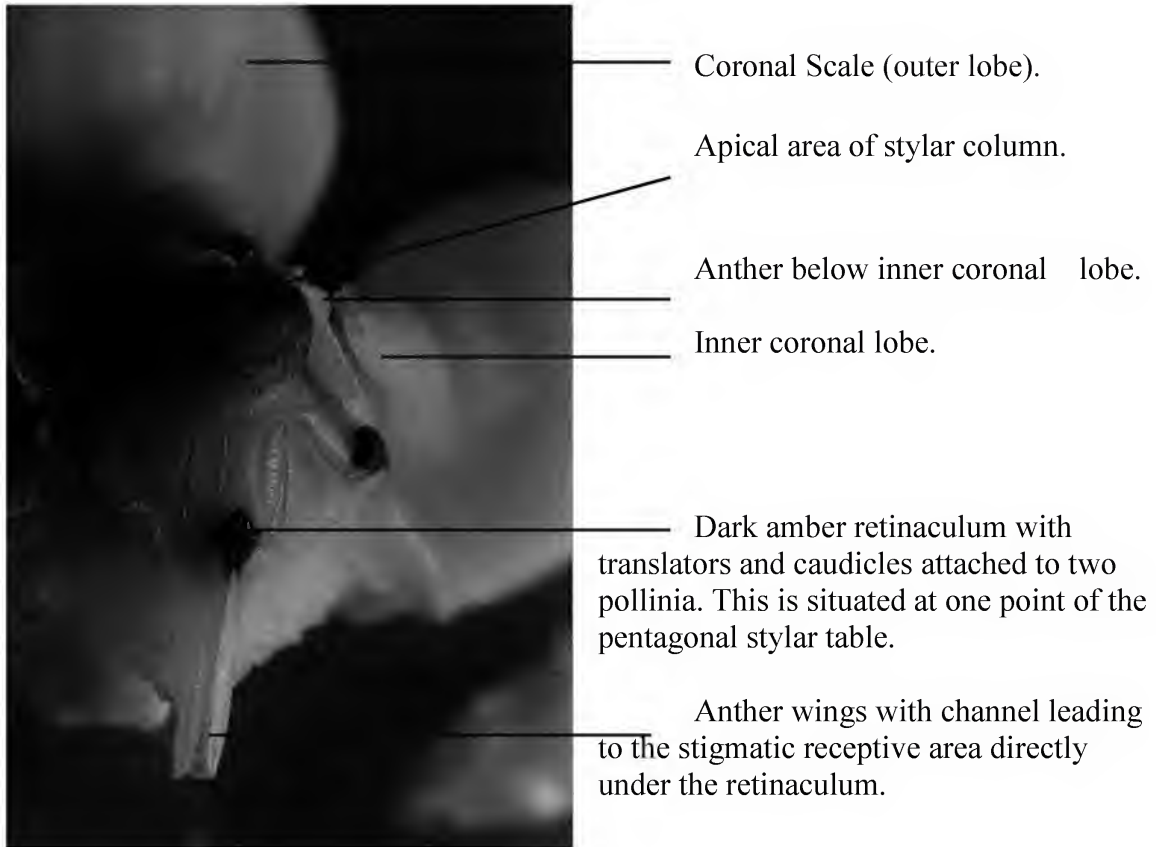


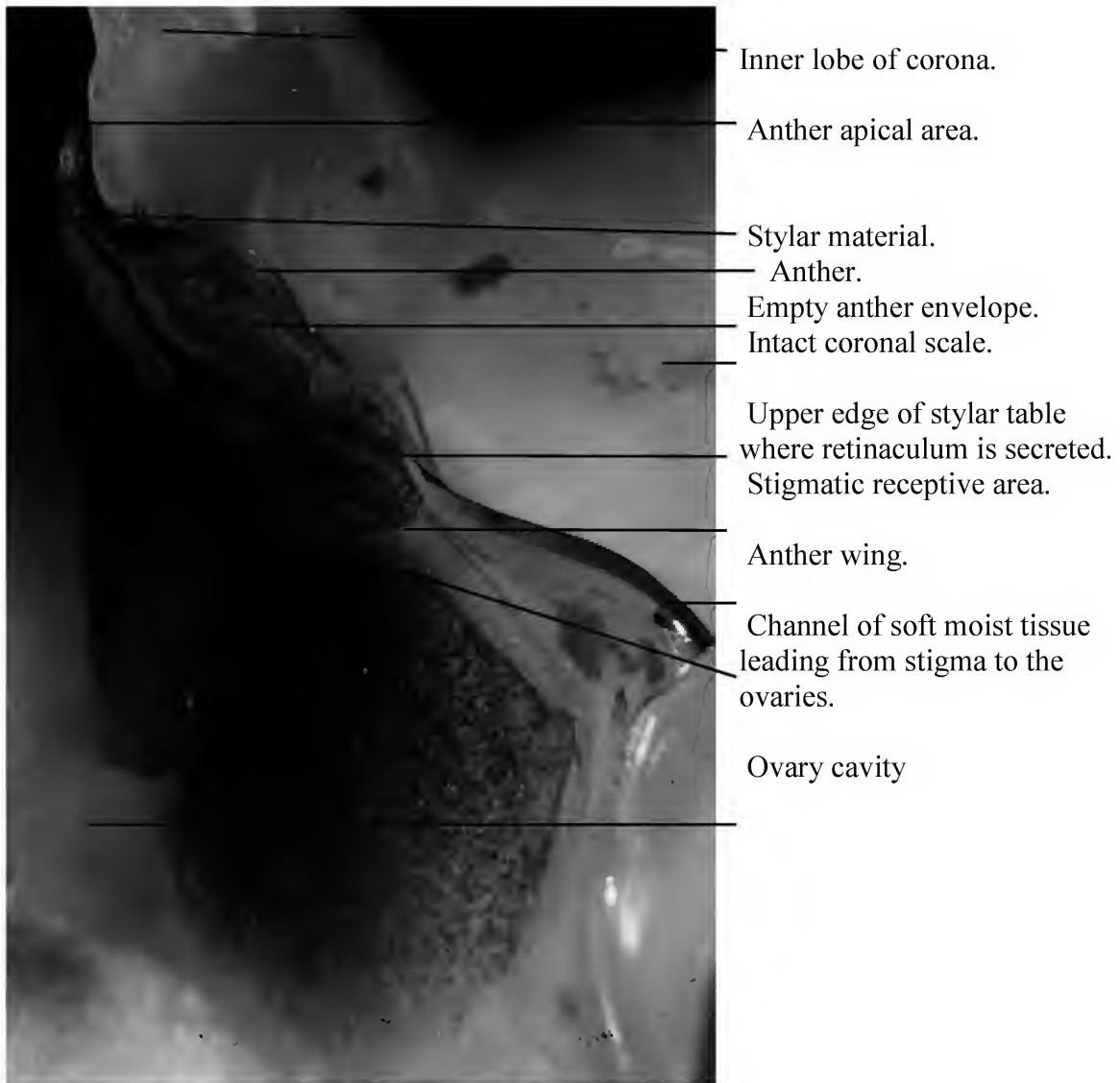
Photo of hoya flower crown (corona), a top view magnified approximately 15 times.

Stylar Table of the Hoya Flower



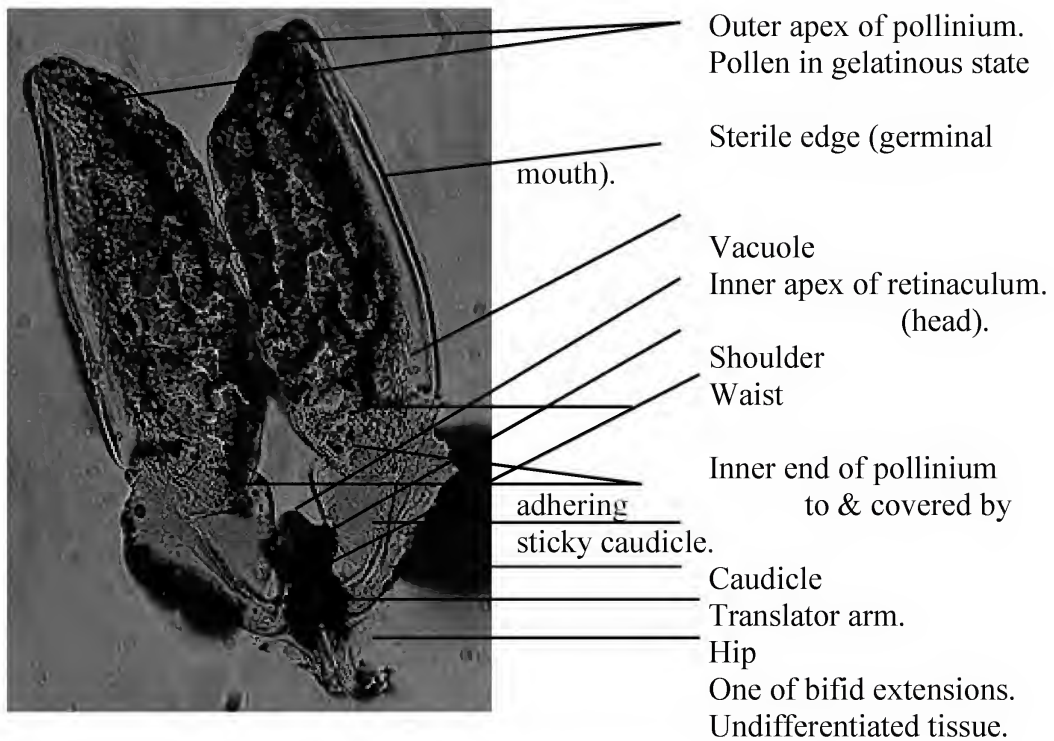
Picture of a hoya pentagonal stylar table. Three coronal scales and the underlying anthers have been removed to show the relative position of the pollinarium. Two scales remain, one at the right side and one above. Magnified approximately 45 times.

Coronal Section



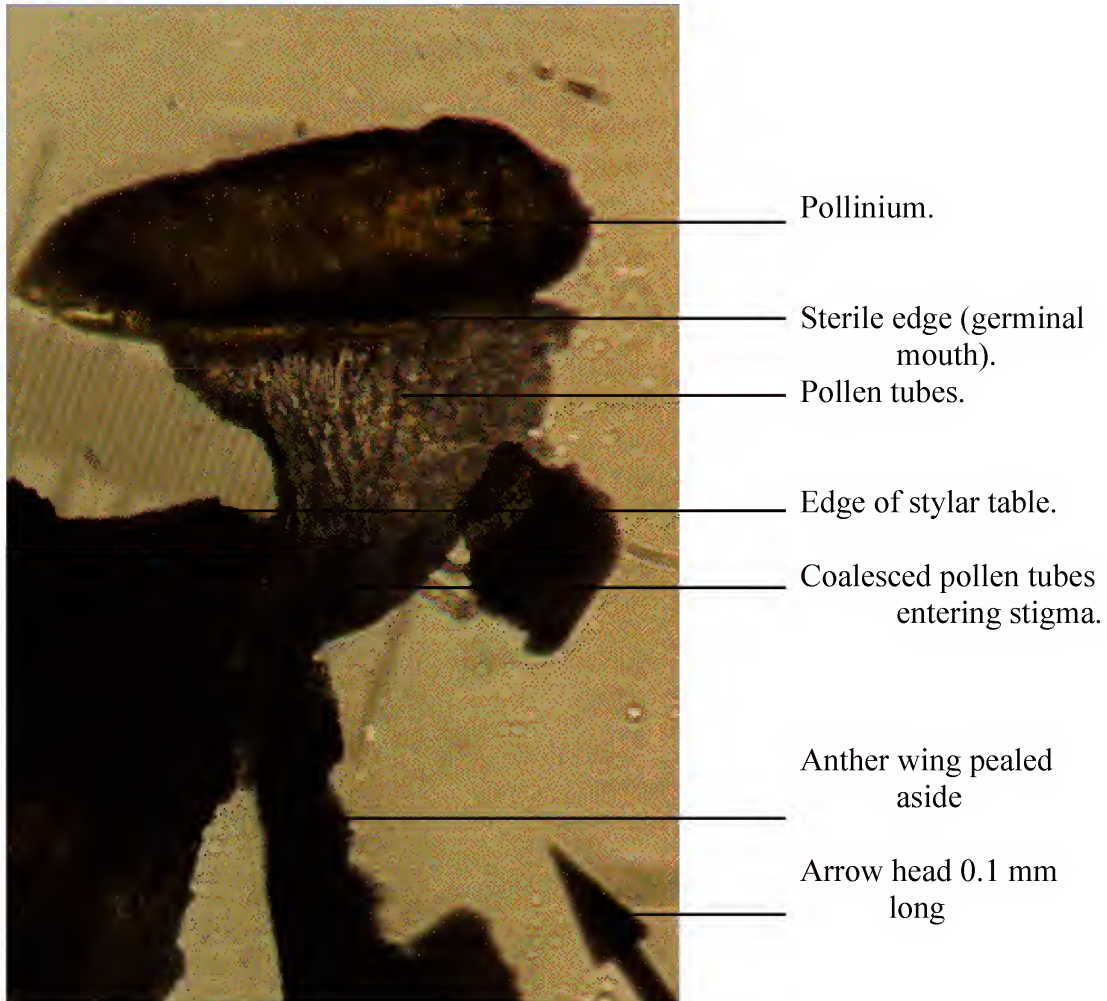
Section between the anther wings of a flower of *Hoya obtusifolia* Wight, magnified approximately 16X. Section stained to bring out structural detail. Showing anther with one empty anther envelope, above which is one intact coronal scale. Below the anther the stylar material has been sectioned cutting through the fused stigma, with the stigma receptive cavity visible at the end of the groove flanked on the right side by one rigid anther wing. Leading from the stigma the channel of spongy material is visible through which pollen tubes would travel if fertilization were to occur. Hollow ovary cavity is visible and labeled above.

The Hoya Pollinarium



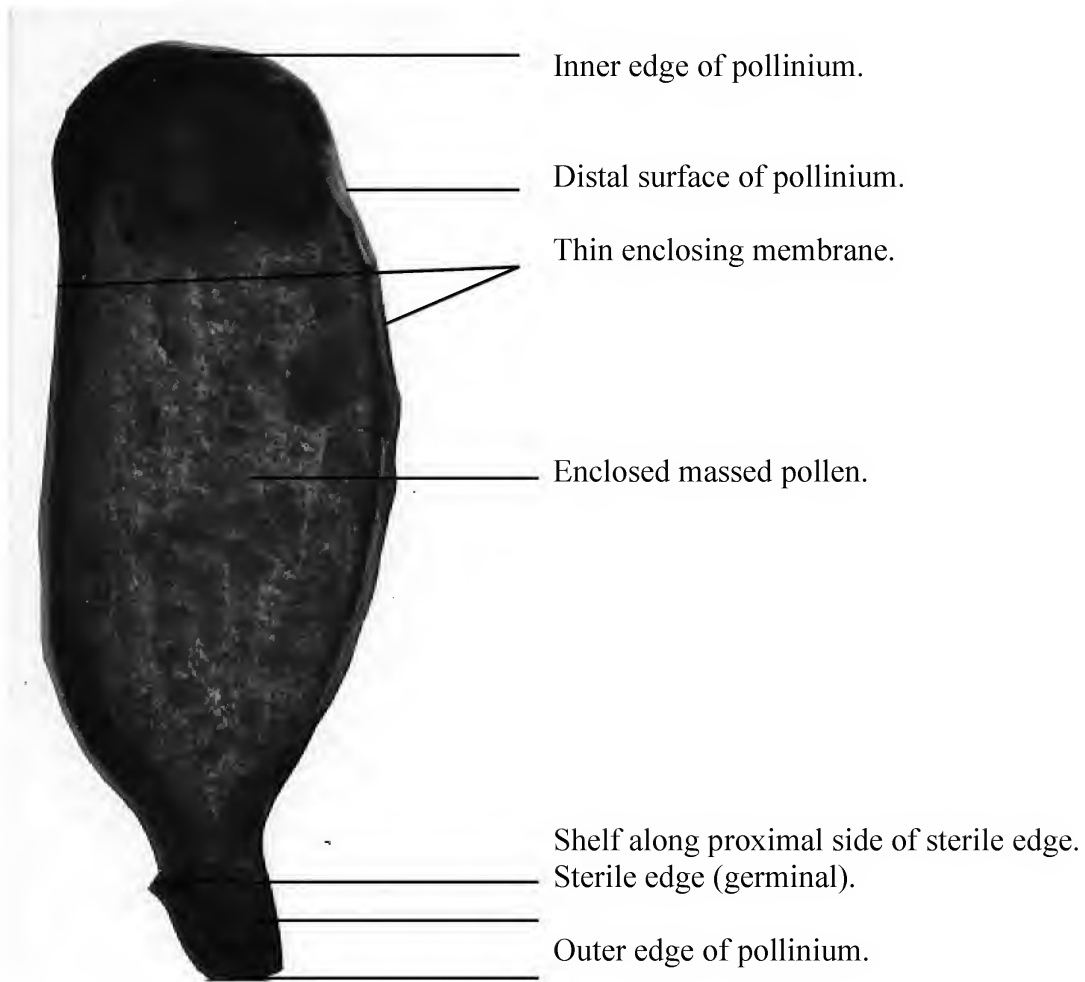
A photo of a hoyo pollinarium magnified approximately 165 times.

Pollinium Germination



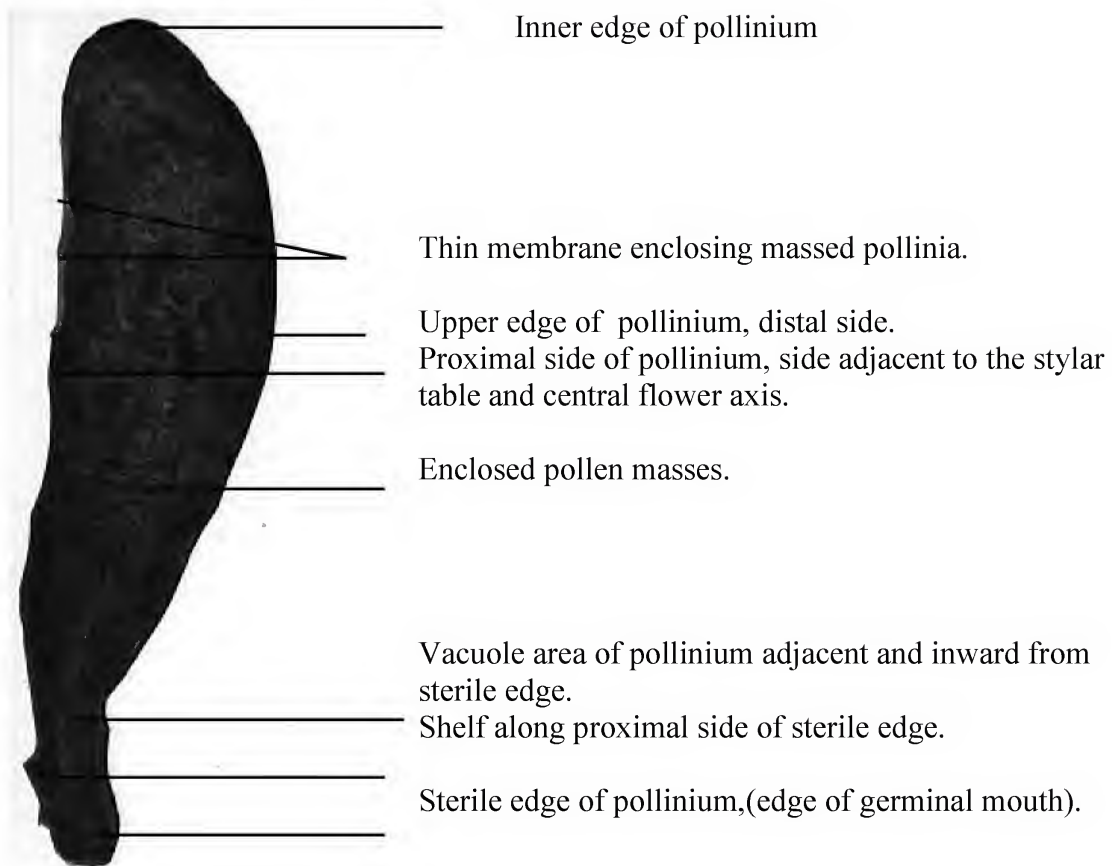
Pollinia magnified approximately 165x showing pollen tubes emerging from sterile pellucid edge (germinal mouth). Tubes coalesce into a tube entering the receptive stigmatic area under where the retinaculum is secreted. Scales and sections removed to photograph this germination.

Cross Sections of Pollinia



Magnified approximately 165x.

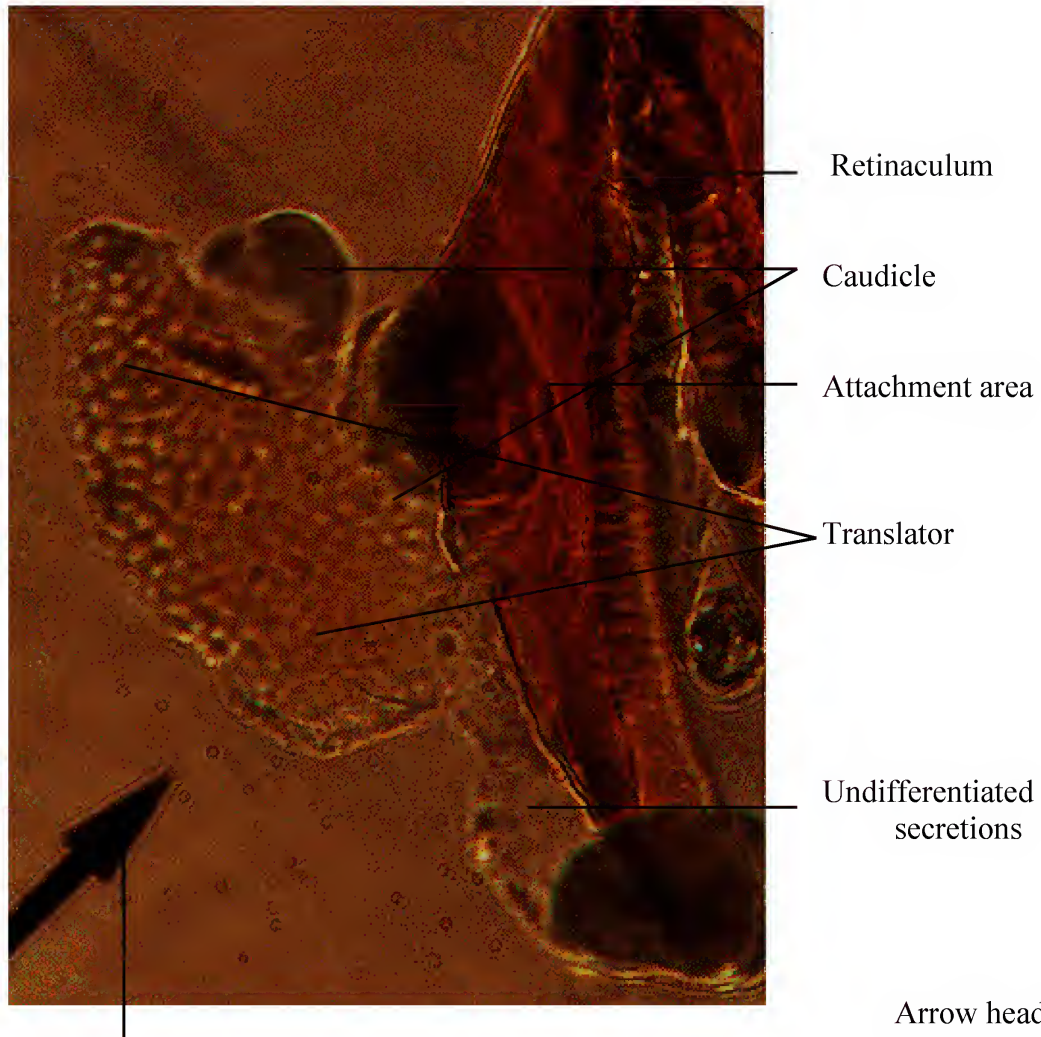
Pollinia from flower of *Hoya obtusifolia* Wight, clone with white corona via CT.
Thailand.



Magnified approximately 165x.

Pollinium from flower of *Hoya imperialis* Lindley, clone via Ted Green from Palawan Island, Philippines. Cross section. Note the difference of the proximal edge of the pellucid edge in this species and the one of *Hoya obtusifolia* shown on page 11.

Translator and Caudicle Development



is 0.1 mm long.

Magnified over 660 X. At this stage of development on the pollinarium the bud of the Hoya flower is covered over 1/2 by the calyx. The translator is more completely developed at this time than is the caudicle, which at this early stage is not yet in contact with the pollinium. The pollinium is still enclosed in the anther envelope. The caudicle and translator are attached inside the retinaculum in a tunnel entering the side at approximately a 45 degree angle extending upward under the broadened shoulder of the retinaculum.

Upper and Lower surfaces of the Retinaculum
from *Hoya imperialis* Lindley, clone from Palawan, Philippines via Ted Green.

Lower Surface View ↓



Pollinia.

Inner apex.

Head area, hollow in
central portion.

Shoulder.

Cavity (tube)
entrance.

Extent of outward
development of
under surface.

Bottom of upper
surface.

Magnified approximately
165x.

Upper Surface View ↓



Pollinia.

Caudicle.

Translator and Caudicle
entering tube in side of
retinaculum.

Caudicle arm.

Translator.

Upper surface of
retinaculum, outer
apical area.

Magnifier approximately 165x.

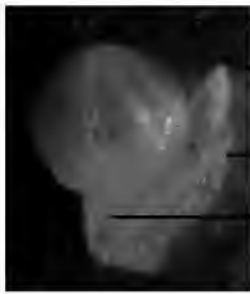
Pollinarium Development Stages

Stage 1: *Hoya kerrii* Craib.



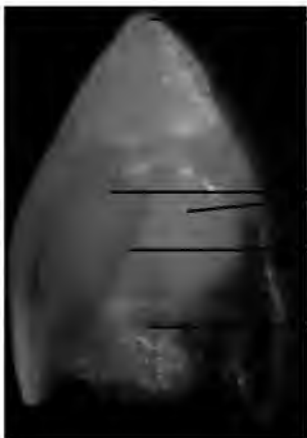
In the very early flower bud stage, prior to any secretion of retinacular structure, the two pollen masses are present in the anther envelopes. At this is time they are not yellow but rather pale cream colored. The anther and stylar table are structurally visible. At this stage no coronal development is visible.

Tight bud stage, 0.34 cm. long x 0.23 cm. widest.



Outer surface of anthers with calyx and corolla
pealed back.
Corolla loosened from bud.
Sepal of calyx pealed back from bud.
Pedicel.

Same bud as above approximately 16X magnification.

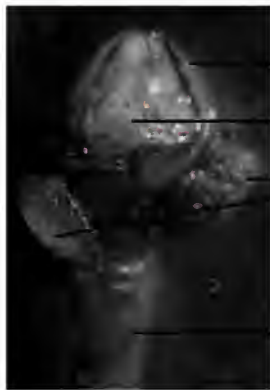


Anther inner apex, proximal surface.
Pollinia within anther sacks (envelopes)
Side where germinal mouth (sterile edge) forms.
Area of attachment to the edge of the stylar table.

Stage 2:



The first visible presence of a retinaculum begins just as the bud begins to swell and the apex of the corolla begins to protrude above the calyx. The upper surface of the retinaculum is secreted first and at this early stage is only present as two thin slivers of darkened tissue connected at the inner end. The translators and caudicle are not present. The pollinia have further enlarged and have become pale yellow in color. In addition the crown has begun to develop (although still colorless).



Corolla.

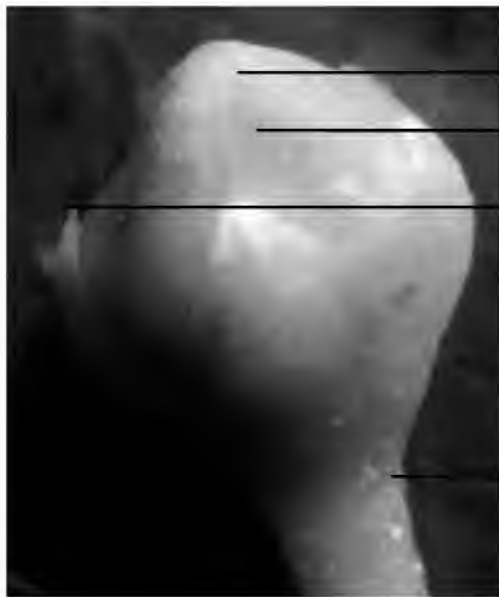
Crown beginning development on outside of anther.

Calyx cut off and peeled back.

Pedicel.

Anther magnified approximately 16X, with calyx and corolla removed or peeled back. Stained to enhance detail.

Stage 3: Parts shown are from *H. kerrii* Craib.

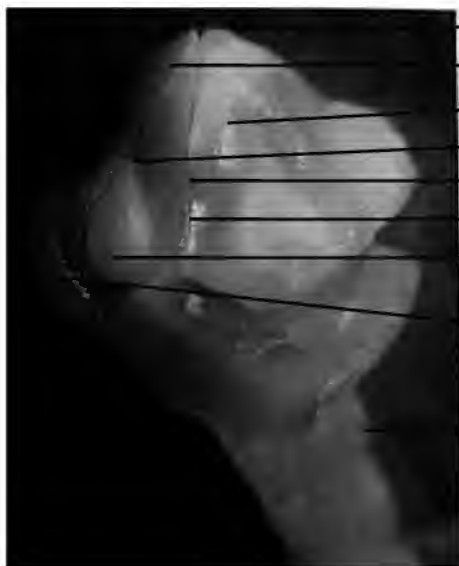


Bud apex.
Corolla lobes still fused.

Sepal (calyx) apex.

Pedicel.

Bud magnified approximately 35 X
0.38 cm. tall x 0.45 cm. diameter.



Anther apex.

Corolla.

Pollinium.

Apex of inner coronal lobe.

Retinaculum shown in bottom photo.

Anther appendage.

Outer coronal lobe just beginning development.

Calyx

Pedicel

Bud as above with sepals and corolla removed and
one anther removed exposing pollinium and
retinaculum.



Anther (wing) with two pollinia still enclosed in envelopes (sacks).

Pollinium (two).

Measurements: base 0.09 cm; height 0.13 cm.



By the time the bud swells to where the calyx reaches approximately half way to the bud apex the retinaculum appears as shown in this photomicrograph magnified approximately 160X. Here the translators are developing but not fully formed. The caudicle is just starting to develop (the bulbous end that eventually envelopes the lower end of the pollinia). In addition the retinacular lower surface has not been fully secreted by the fused stigmas.

Stage 4: At the time the flower is beginning to open the pollinia are released from the anther envelopes and adhere to the gelatinous sticky caudicle. The caudicle in turn is supported by the triangular (wedge shaped) translator arm which lies in the groove where the anther adheres to the edge of the stylar table.

Terminology

Excerpts from Historical Usage's of Terms Pertaining to Hoya Pollinarium

Over time, various terms have been used for the different parts of the male reproductive structures. See my labeled photo page 9 of the parts involved.

The oldest reference I have is Vahl's 1810 use of the term "**corpusculi**" for the secreted central holder. Vahl applied this term in the description of the species *Sperlingia verticillata*, now determined to be *Hoya verticillata* (Vahl) G. Don. I would assume on the basis of priority alone, this term would be the most appropriate to use, however priority does not necessarily apply in such cases. I had preferred and used the term "**retinaculum**", much used by Schlechter, and others. This latter term was also used by Blume in Rumphia IV 1848.

In regard to the pollen which is in coherent masses the designation "**massae pollinis**" was applied in 1811:84 in Anton's Hortus Kewensis and repeated by many subsequent authors (in Latin or English) up to the present time. The secreted connection of the pollen masses and the corpusculum has gone by various names. It was King and Gamble in 1901:559 (Flora of the Malay Penn.) who said "attached by caudicles of various shapes". In reality the pollinia are attached at their base by a sticky, usually clear gelatinous mass, best termed a "**caudicle**". It must be noted this structure may be fused to the underlying structure and barely visible. This structure is supported in many cases by a more rigid wedge shaped structure that I have labeled a translator or translator arm (not originated by me). It is the upper slightly concave surface that supports the caudicle in most cases.

The term **translators** appears in Perkins (Fragmentia Fl. Philipp.) by Schlechter & Warburg. It is repeatedly used in many German descriptions i.e. Wettstein, Schumann & Lauterbach et al.

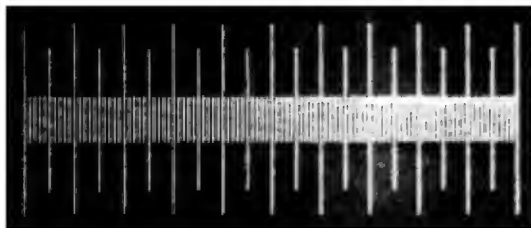
Confusion as to what is referred to by the use of “*pollinia*” for the structure enclosing the pollen but also used for the whole male structure is unfortunate. Forster and Liddle have used the term “*pollinarium*” for the whole structure 1990 in A checklist for the Genus Hoya R. Br. (Asclepiadaceae) in Papuaia. As far as I can determine this term was used by Lynch 1977 for descriptions in the Genus Asclepias.

The following is an attempt to put into dated sequence the use of the various terms in regards hoyas:

- 1810 “*Germinia duo sub centro corpusculi*” 114 **Vahl**: in Gkrivter af Naturhistorie-Gelskabet.
- 1811 “*Massae Pollinis...*” 84 in **Aiton’s** Hortus Kewensis.
- 1825 “*Massae pollinis*” 1062 **Blume**: in Bijdagen tot de Flora van Nederlandsche Indie.
- 1837 “*pollen masses* fixed by the base,” 125 and “*pollen masses* erect, fixed by the base to the back of the *corpuscles*” 128 in **G. Don** General Sys. of Gardening and Botany.
- 1844 “*Massae pollinis* erectae, approximatae, ad *corpusculi* dorsum basi affixae” 663 et al, and “*saepius margine pellucidae*” 634 in **Decandolle**, Prodramus Sys, Veg..
- 1848 “*Massae pollinis...*” 310 in Fleur des Serres. VI
- 1848 “*Pollinia* basi affixa” and “*Retinacula* minutissima*pollinia* basi affixa” et al 50 and *Retinacula* emarginaturis stigmatis.....*Pollinia* clavatacornibus *retinaculi* affixa.” 51 **Blume**: in Rumphia IV.
- 1852 “*Pollinia* basi affixa.....” 64 **Walpers**: in Annales Botanices Systematicae.
- 1865 “*Massae pollinis* ...” 159 **Muller**: in Fragmenta Phytographiae.
- 1883 “*pollen- masses* 2 to each anther,..” 319 **Bailey**: in Synopsis of the Queensland Flora.
- 1883 “*pollen-masses* various” 52 **Hooker**: in Flora of British India.
- 1895 “*pollen masses*” 162 **Trimen**: in Handbook of the Flora of Ceylon.
- 1901 “*pollen-masses* 1 in each anther call, erect, waxy, usually flattened, often thickened on the outer margin, attached by *caudicles* of various shapes,to the horny hard *pollen carriers*.” 559 et al **King & Gamble**: in Jour. of the Royal Asiatic Soc., Bengal Branch. A lot of attention has been given in their species descriptions to variations in the *caudicles* e.g. conical “pollen carriers” and “cup-like caudicles.”
- 1902 “*pollen masses* waxy” 320 **Collett & Hemsley** in Flora Simlensis.
- 1903 “*Pollinia* basi affixa” 478 et al in Plantae Hochrutinernae.
- 1904 “*polliniis* compressis oblique oblongis, *translatoribus* prebrevibus diatis, *retinaculo* ...” 131 et al and “*caudicululis* ...” 133 **Schlechter & Warburg**: in Fragmentia Florae Philippines.

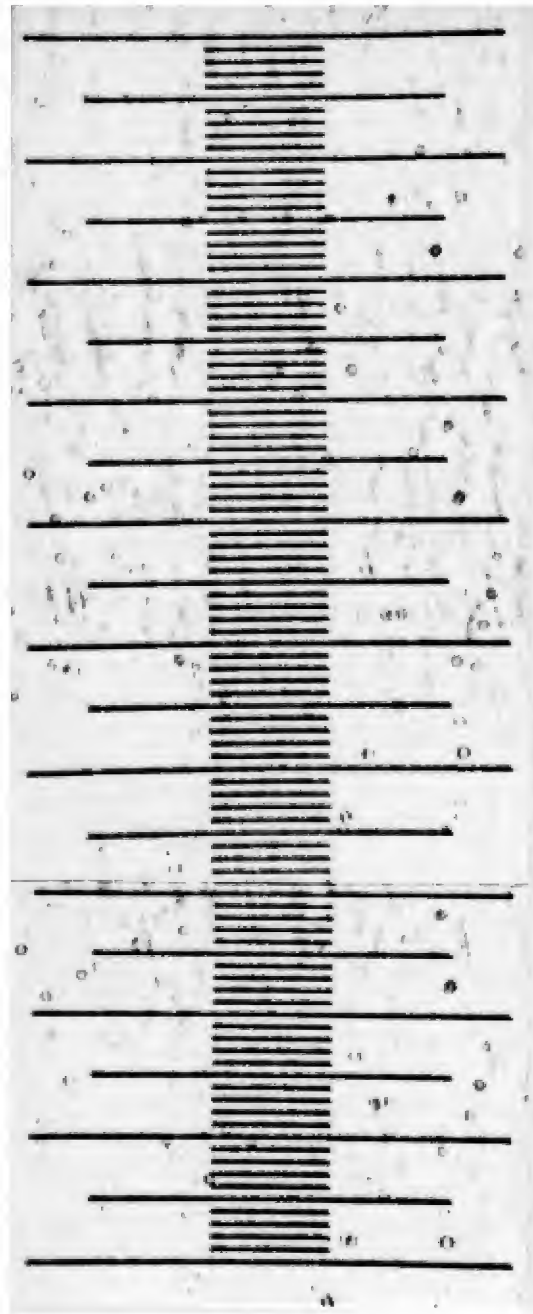
- 1905 “*polliniis oblique oblongis, translatoribus brevibus, retinaculo rhomboideo....*” 362 et al **Schumann & Lauterbach**: in Nachtrage Zur Flora der Deutschen Schutzgebieten.
- 1911 “*Pollinien. Translatoren mit klemmkorpern.*” 450 **Wettstein**: in Handbook Sys. Botanik.
- 1912 “*masses polliniques oblongues, attachees par des caudicules en coupe a un retinacule ...*” 9 et al **LeConte**: in Flore Gen. De L Indo-chine.
- 1912 “*pollen-masses 1 in each cell.*” 380 **Merrill**: in A Flora of Manila.
- 1920 “*polliniums solitary..*” **Fyson**: in Flora of the Nilgiri & Pulney Hill Tops.
- 1922 “*Pollinia 1 in each cell,*” 561 **Haines**: in Botany of Bihar & Orissa.
- 1923 “*pollen in waxy masses*” 208 **Parkinson**: in A Flora of the Andaman Islands.
- 1923 “*pollen masses erectattached by distince caudicles to the horny pollen carriers*” 848 **Gamble**: in Flora of the Presidency of Madras.
- 1923 “*Pollinia single, waxy with short thick caudicles.*” 394 **Ridley**: in Flora of The Malay Penn.
- 1956 “*pollen masses.... corpuscula cornea ...*” 462 **Henry**: in Journal Bombay Natural History Society 75.
- 1960 “*Pollinia erect from dark horny corpuscula....*” **Pham-Huong**: Flora du Vietnam.
- 1965 “*pollinia solitary*” 751 **Ohwi**: in Flora of Japan.
- 1965 “*pollinium solitary in each anther cell, erect, often pellucid-margined on one side*” 266 **Backer** in Flora of Java.
- 1973 “*pollen -masses.....*” 50 in **Huber**: A Revised Handbook of the Flora of Ceylon.
- 1974 “*polliniis in quoque loculo solitariis..... caudiculis erectis brevissimis, retinaculo oblongo,.....*” 126 **Tsang & Li**: in Acta Phytotaxinomica 12 #1.
- 1976 “*Pollinia erect from dark horny corpuscula, 2 anther, waxy without pellucid margins.*” 449 **Saldanha & Nicholson**: in Flora of Hassan Dist. Karanataka India.
- 1978 “*Twin-Pollinia*” “both *pollinia* and *caudicles* are winged with *caudicle* wings being very broad” 475 and “*pollen masses known as pollinia: by secretions of the stigma which produce the caudicle and corpuscule*” **Rintz**: in Malay Nature Journal.
- 1984 “*pollinia marginem pellucida...., caudiculis brevibus..., retinacula elliptico...*” 119 **Li**: in Bull. of Botanical Research IV.
- 1990 “large *pollinarium*: 5 **Forster & Liddle**: A Checklist for the Genus *Hoya* R. Br. (Asclepiadaceae) in Papuasias.
- 1992 “*pollen in pollinia.*” 596 in Royal Hort. Soc. Dictionary of Gardening 2.
- 1992 “*Pollinarium 1.3-1.4 mm long , 1.2-1.3 mm wide; pollinia oblong, 1.12-1.15 mm long, 0.35-0.42 mm wide, with pellucid germination mouth on outer edge; corpusculum ovate, 0.8-0.9 mm long, 0.55-0.58 mm wide; caudicles 0.30-0.35 mm long,*” 629 et al **Forster & Liddle**: in Austrobaileya 3(4): 627-641.

Measuring Gauge
100 micron (1 mm) scale imbedded in slide.



Magnified 65 times.

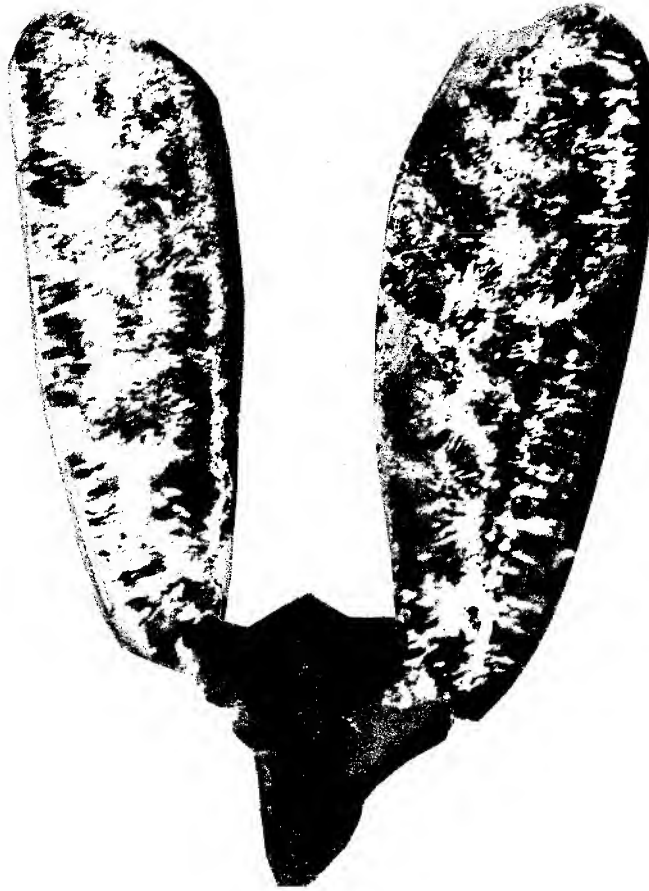
The above type magnified scale, and the one on the following page, were used in measuring the pollinaria features in this study. The scale is one millimeter long, divided into 100 segments, on a microscope slide covered with a cover slip. Measurements can be made direct at the time of viewing, or of the enlarged photos.



One millimeter scale magnified 165 times.

Hoya kerrii Craib 1911
The five pollinarium from one flower.

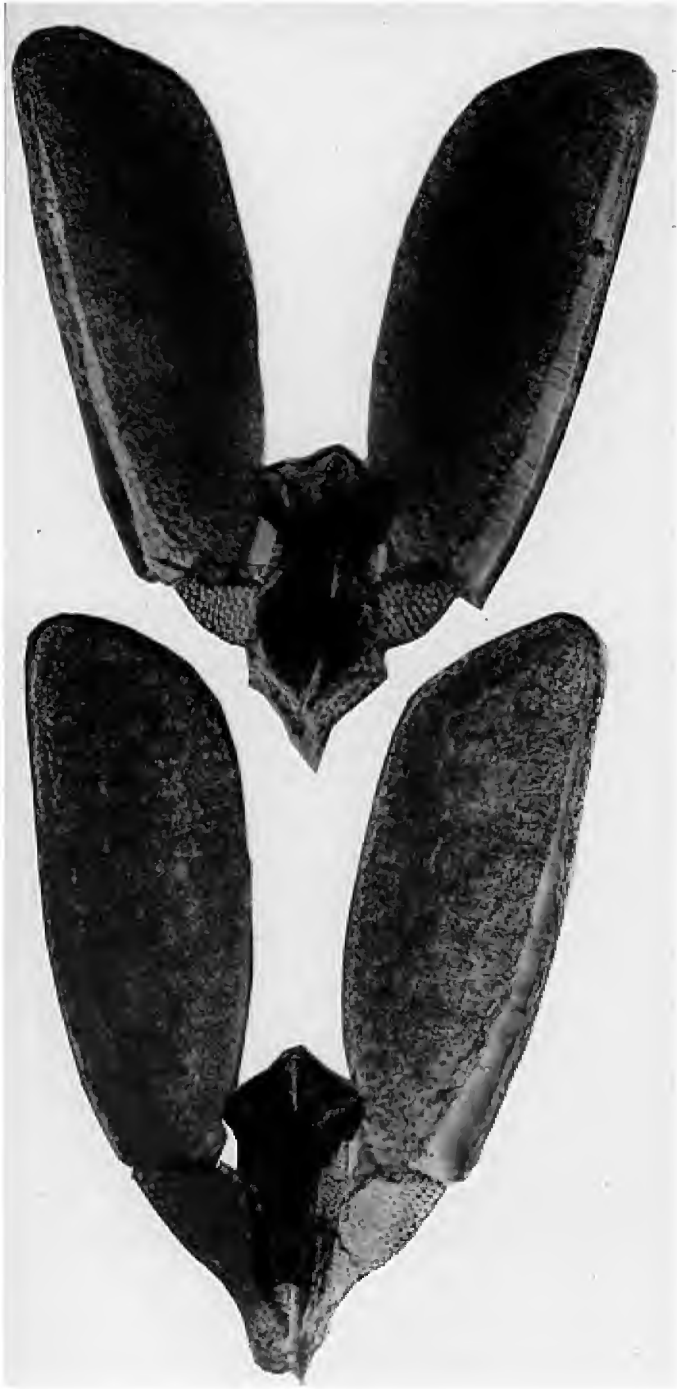
#	Length			(Pollinium)		Width	
	<u>Right</u>	<u>Left</u>	<u>Difference</u>	<u>Right</u>	<u>Left</u>	<u>Difference</u>	
1	0.57 mm	0.57 mm	0.00 mm	0.19 mm	0.19 mm	0.00 mm	
2	0.58 mm	0.59 mm	0.01 mm	0.19 mm	0.19 mm	0.00 mm	
3	0.56 mm	0.56 mm	0.00 mm	0.19 mm	0.19 mm	0.00 mm	
4	0.57 mm	0.59 mm	0.02 mm	0.19 mm	0.19 mm	0.00 mm	
5	0.59 mm	0.55 mm	0.04 mm	0.20 mm	0.16 mm	0.04 mm	



All pollinium here magnified approximately 160 X. Above is pollinium #5. On the following page arranger left to right top to bottom is #1, #2, #3 and #4. There is as to be expected some slight differences in development of the various parts giving rise to different measurements. In addition differences in focal depth and positioning of parts after removal from the flower also may contribute to some differences.



Comparison of Pollinaria
Hoya merrillii Schltr., flowering's of five (5) different years at Fresno, Calif..



1990 flowering.

1991 flowering

approximately 165x.

Pollinaria magnified



1992 flowering.

1993 flowering

Pollinaria magnified approximately 165x.



1994 flowering.

Pollinarium magnified approximately 165x.

There appears to be slight variations in the pollinarium of one clone flowered in different years. Some variation in photos results from the focal plane selected. The thickest structure, the retinaculum, gives the most difficulty since the head may rise above the plane of the pollinia. This difference gives rise to photos that appear different but are actually views of different depths on the same object. I was surprised at minimal variation when the results of this study was completed and assembled. There is always variation in the amount of undifferentiated material clinging to the outer apical area of the retinaculum and sometimes along the translators.

Comparison of Pollinaria
Hoya sp. 80-03, flowered at three (3) different locations.



Flowered at Kaaawa, Hawaii

Flowered at Fresno, Calif..

Pollinaria magnified approximately 165x.



Flowered in Central Point, Oregon.

Magnified approximately 165x.

The pollinia flowered at different locations show slight variation, but are recognizable as form the same species. The pollinia on the right (Fresno flowering) appears shorter but is the result of being skewed toward the outer apex slightly. As with flowerings of different years most variation shown here is the result of focal plane choice. It actually takes a number of photos to determine precisely the variations involved.

Scanned Photos of Pollinarium

On the following pages I present my present data base of microscopic photos of Hoya pollinarium compiled from various sources as mentioned in the “Acknowledgment” section. I have attempted to present these in some rational order, but this I find difficult. In the majority of cases the taxa is presented with magnifications of about 165 times (165x) normal size. Since not all photos were made at this magnification it was necessary to present some at the smaller magnification of 65 times (65x) normal size. I have included some taxa in both magnifications so that a reference size can be observed.

As stated in Materials and Methods the most disconcerting problem that has arisen, is viewing (and thus photographing) the retinaculum. This structure has thickness (depth of field) which makes it most difficult to present a photo or composite to represent the structure in its entirety. This is especially true as magnifications become larger where details are revealed in the other structures of the pollinarium, and measurements are thus more precise.

In this revised edition I have included photos in color taken from project files on individual species called “Passport”

They are presented in descending order from the longest pollinia measurements to the shortest.

Note: 1. See Appendix page 257 for listing of species pollinarium data..

2. See end for parts classifications with photos of parts.

Hoya archboldiana Norman 1937



The pollinarium enlarged approximately 48 times. Note here the enlargement of the sterile edge as it approaches the inner end of the pollinia. The relatively narrow and cupped translator arms and the very small clear caudicle. The dark retinacula is broad of definite shape with the lower divided end. The orifice in the side of the retinaculum just above the waist area is plainly visible.

Pollinarium

Pollinium

length	1.72 mm
width	

Retinaculum

length	0.26 mm
shoulder	0.30 mm
waist	0.16 mm
hip	0.22 mm
extensions	0.12 mm

Translators

length	0.31 mm
depth	0.03 mm
width	0.04 mm ca.

Caudicle

bulb diam.	0.10 mm
------------	---------

Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: granulate G

Retinacula character: S



This is an enlargement of the side of the retinaculum approx. 165x. This shows clearly how the relatively clear, sticky caudicle is cradled by the concave top of the translator arm. The lower end of the pollinium is at the upper side of the picture, and a portion of the retinaculum at the lower left side.

***Hoya macgillivrayi* Bailey 1914**



Pollinarium
enlarged about
165x.

Pollinium

length 1.35 mm
widest 0.43 mm

Retinaculum

length 0.60 mm
shoulder 0.40 mm
waist 0.30 mm
hip 0.35 mm
ext 0.08 mm

Translator

length 0.20 mm
depth 0.04 mm

Translator/caudicle type: ls/o

Pollinia inner end type: R

Base: FL

Caudicle bulb: clear

Retinacula character: HE

Caudicle bulb diam. 0.16 mm

Hoya multiflora Blume 1823

Flowered at Fresno, CA. from silvered leaf clone labeled "True".



Pollinaria of green Rt. and true left enlarged about 64x.

True form:

Pollinia

length	1.27 mm
widest	0.28 mm

Retinaculum

length	0.20 mm
shoulder	0.18 mm
waist	0.07 mm
hip	0.12 mm
ext.	0.07 mm

Translator

length	0.22 mm
depth	0.03 mm

Caudicle

bulb. diam.	0.10 mm
-------------	---------

Translator/caudicle type:
ls/o

The green form is smaller.

Pollinia inner end type: R
Caudicle bulb: ?

Hoya albiflora Zipp. ex Blume

Pollinarium enlarged only about 65 times so you see how relatively large it is, it is among the biggest. It has a well-developed retinaculum and distinct translator arms supporting clear caudicles. The type description says "base crural (end) glued to the retinaculum" of course this is never the case. The end are glued by the clear bulbous caudicles which in turn are supported by the more structured translator arms, which are wedge shaped structures with slightly convex tops into which the tail end of the caudicle rests.

Pollinarium: large, well formed with long translators and large caudicles. Here the caudicle has surface granulations whereas in most cases it is clear.



Pollinium:

length	1.22 mm
widest	0.45 mm

Retinaculum

length	0.61 mm
shoulder	0.50 mm
waist	0.22 mm
hip	0.22 mm
extensions	0.18 mm

Translators

length	0.25 mm
depth	0.04 mm

Caudicles

bulb	0.09 mm
------	---------

Translator/caudicle type:
ls/o

Pollinia inner end type: R

Caudicle bulb: granulate G

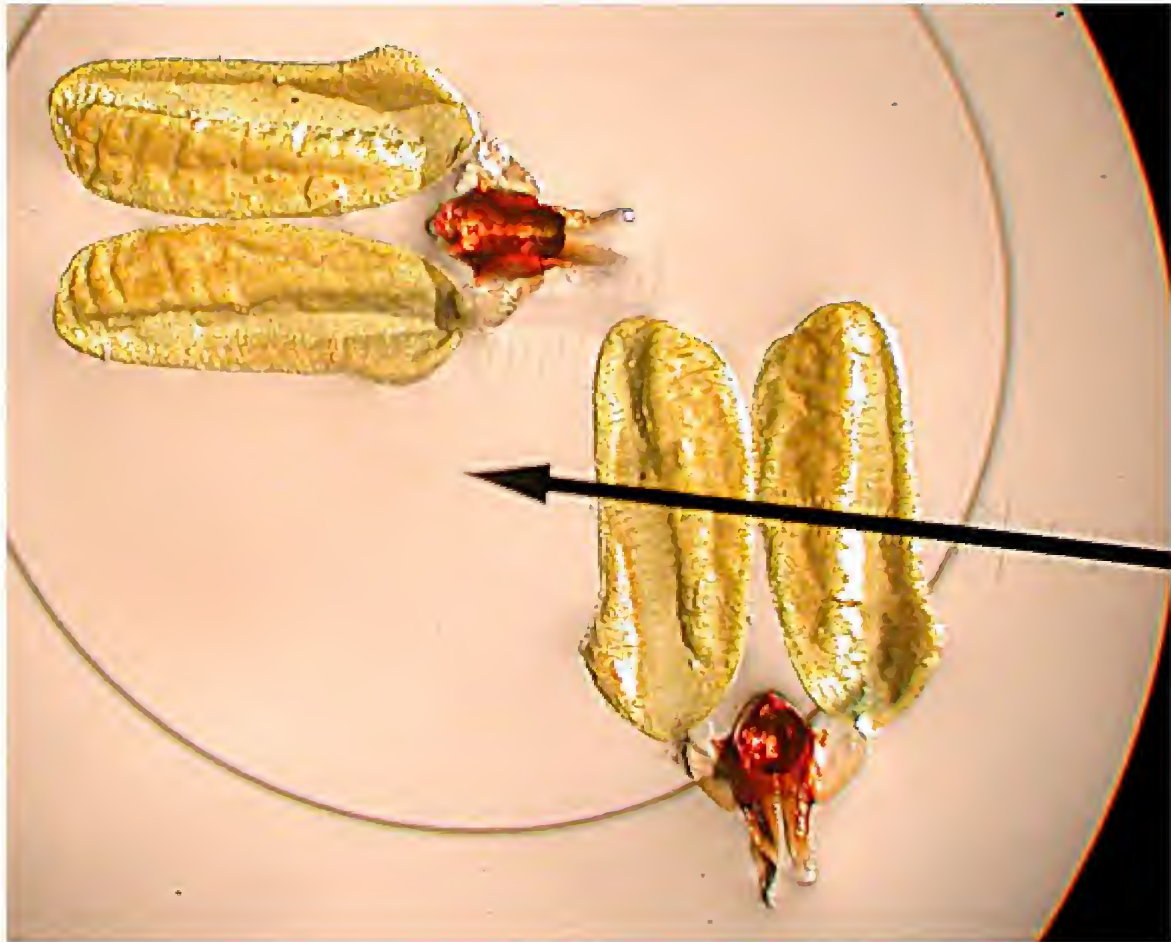
Retinacula character: S



Enlarged ca. 165x. **This is the most massive pollinarium I have examined!**

Hoya onychoides P. I. Forster & Liddle 1995

Flowers sent by Torill Nyhuus in March 2007 in liquid. Data 4/14/07



Pollinaria enlarged about 85x.

Pollinium

length	1.09-1.14 mm
widest	0.38 – 0.40 mm

Retinaculum

length	0.35 mm
shoulder	0.30 mm
waist	0.23 mm
hip	0.24 mm
ext.	0.20 mm

Pollinia inner end type: R

Caudicle bulb: clear C

Translator/caudicle type: ls/o

Retinacula character: P

Translator

length	0.25 mm
widest	0.07 mm

Caudicle bulb diam. 0.10 mm

Hoya sp. CAHUP 8359 (41559)

This is an *Hoya imbricata* species.



Pollinarium with one
pollinium missing
enlarged about 165x.

Pollinium

length	1.09 mm
widest	0.16 mm

Retinacula

length	0.36 mm
should.	0.10 mm
waist	0.05 mm
hip	0.10 mm
ext.	0.04 mm

Translators

length	0.32 mm
depth	0.06 mm

Caudicle

bulb diam.	0.08 mm
------------	---------

**Translator/caudicle
type:** fb/cw

Pollinia	inner	end
type:	R	

Retinacula character: E

Ratio: r/p	4.2
p/w	6.8

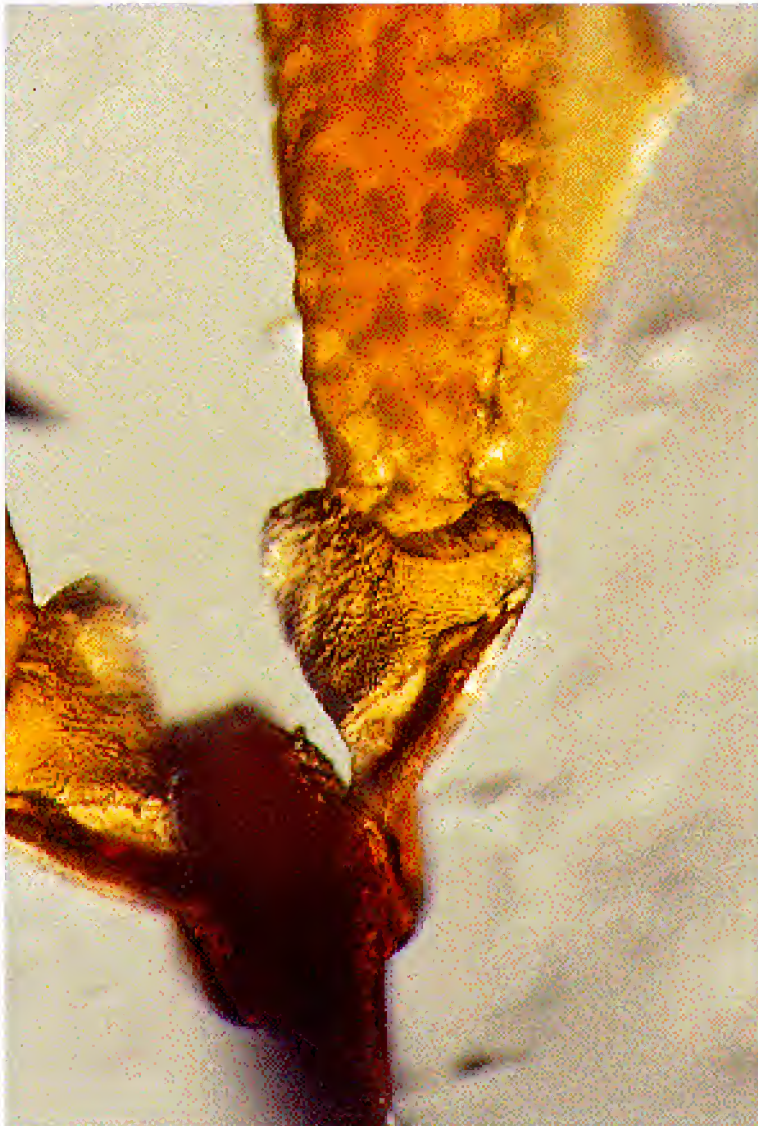
Hoya elliptica Hooker f. 18883

via C.T., in Thailand



Pollinarium enlarged about 65x. In one instance the retinaculum had this very long extension, as if extraneous material was secreted. The widened shoulders on the lower outside portion of the pollinia is typical of a few hoya species among them *Hoya australis* R. Brown and *Hoya lobii* Hooker. The pellucid edge flares out above the enlarged vacuole area and does not extend on down the side of the pollinia. I believe the retinaculum has turned on its axis and that the translators and caudicles are attached well down on the structure.

I wanted to show the complexity of this species even in the reproductive parts. Here below is a portion of the pollinarium is enlarged about 165x and shows the elaborate caudicles, usually clear but here differentiated and supported by a rather narrow (at least edgewise) translator arm which appears to be very rigid. The retinaculum of this species I believe flips on its axis when removed. I think it has a relatively long narrow head and a bulbous bottom with the translators and caudicles attached well down. It should be examined more closely while still attached to the pentagonal styler table and the pollinia in their anther pockets to understand its true nature. Note Rintz's drawing.



Pollinarium:

Some similarities to *Hoya australis* and *Hoya cumingiana* as far as the outer clear winged formation on the outside of lower part of the pollinium.

Pollinium

length 1.07 mm
widest 0.34 cm. Yellow.

Translators

length 0.32 mm
depth 0.04 mm opaque.

Caudicles

bulb diameter oval ca. 0.15 mm opaque.

Translator/caudicle type: l/cw **Pollinia inner end type:** R **Caudicle bulb:** granulate G
Retinacula character: E

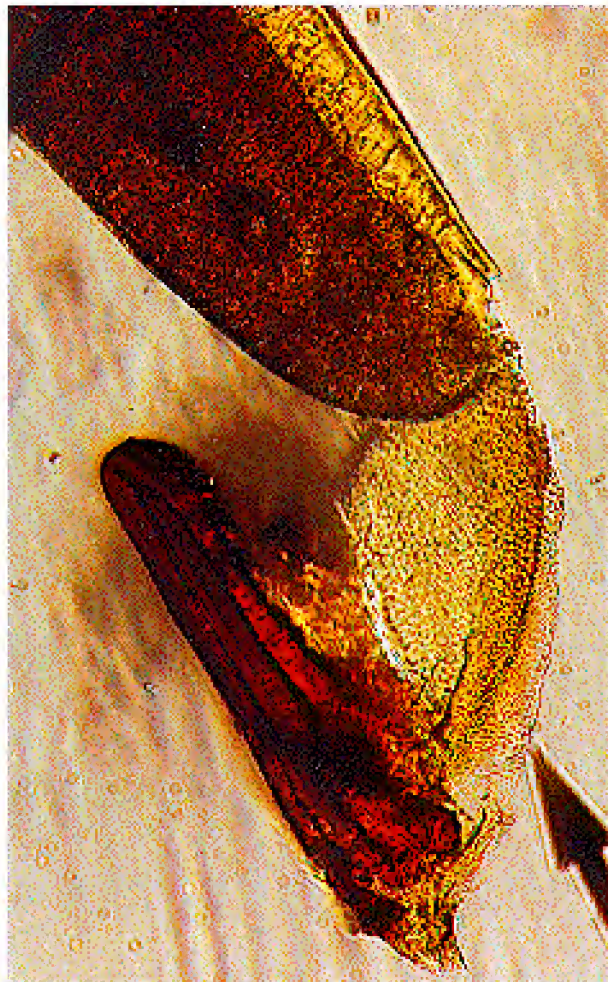
Hoya coriacea Blume 1826

Flower from Ann Wayman 8/92



This is a photomicrograph of the Pollinarium at only about 65 magnifications. It is large so taken at 165x it is only partial visible. The general features are visible here. The long regular rounded ended pollinia and the long rather linear retinaculum and also the long translator arms supporting the clear bulbous caudicles.

To the right is a photo enlarged about 165 x. This pollinarium is very distinctive. Note that the translators are attached between the waste and hips of the retinaculum, which is long and relatively narrow, the hips already well down the structure. The translator although more densely cellular is not as distinct from the caudicle as in most hoyas.



species, and the caudicle is also cellular like structured. Here it can be seen that the pellucid sterile edge of the pollinia ends inwardly in a apiculate protrusion just above where a orifice exists on the outer edge of the pollinia which allows nectar to enter the pollinium. The translators and caudicles are always attached to the retinaculum in a whole in the side of the retinaculum (an internal attachment).

Pollinarium: Pollinia 1.08 mm long 0.30 mm widest. Retinaculum 0.59 mm long. Caudicle 0.35 mm long. Translator: 0.52 mm long curved.

Pollinia inner end type: R

Translator/caudicle type: ls/o

Caudicle bulb: granulate

Retinacula character: E

Hoya lobii Hooker f. 1883

from C.T. in Thailand



The pollinarium here enlarged about 65x, so this is a large pollinarium. The apical lobes of the pollinia are rounded and taper inwardly. There is a broad extension on the lower outside of the pollinia, which is also seen in pollinarium of some species labeled *Hoya odorata* Schlechter and also *Hoya vitiensis* Turrill.

The retinacula here is really broad and short with extended shoulder area narrow waist and flaring hip areas. The translators extend outwardly and support a rather large bulbous yellowish caudicle.

Pollinarium: this is one of the larger pollinaria.

Pollinia

length	1.06 mm
widest	0.40 mm well down the side.

Retinaculum

length	0.50 mm to the crotch.
shoulder	0.47 mm wide
hip	0.25 mm
waist	0.38 mm wide.
extensions	0.17 mm long.

Translator

length	0.30 mm
depth	0.10 mm

Caudicle

bulb diam.	0.14 mm
------------	---------

Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: granulate

Retinacula character: S

Hoya amrita Kloppenburg, Siar & Ferreras 2011 Type clone



Pollinium

length 1.05 mm
widest 0.28 mm

Retinaculum

length 0.35 mm
shoulder 0.22 mm
waist 0.10 mm
hip 0.10 mm
ext. none

Translator

length 0.10 mm
depth 0.01 mm

Caudicle

bulb diam. 0.08 mm

Translator

Caudicle Type:
ls/o

Pollinia inner end type: R

Caudicle bulb:
clear C

Retinacula character: HE

The retinaculum here is turned on its axis. Below a photo with retinacula in proper position.

Enlarged about 200x.

Hoya imperialis Lindley 1846

Flower from clone at Sebang, Palawan, Philippines via Ted Green.



Magnified 165x.

Pollinarium

Pollinium

length 1.02 mm

widest 0.30 mm

Retinaculum

length 0.29 mm

shoulder 0.32 mm

waist 0.17 mm

hip

ext. 0.10 mm

Translators

length 0.22 mm

depth 0.04 mm

Caudicle

bulb diam. 0.13mm

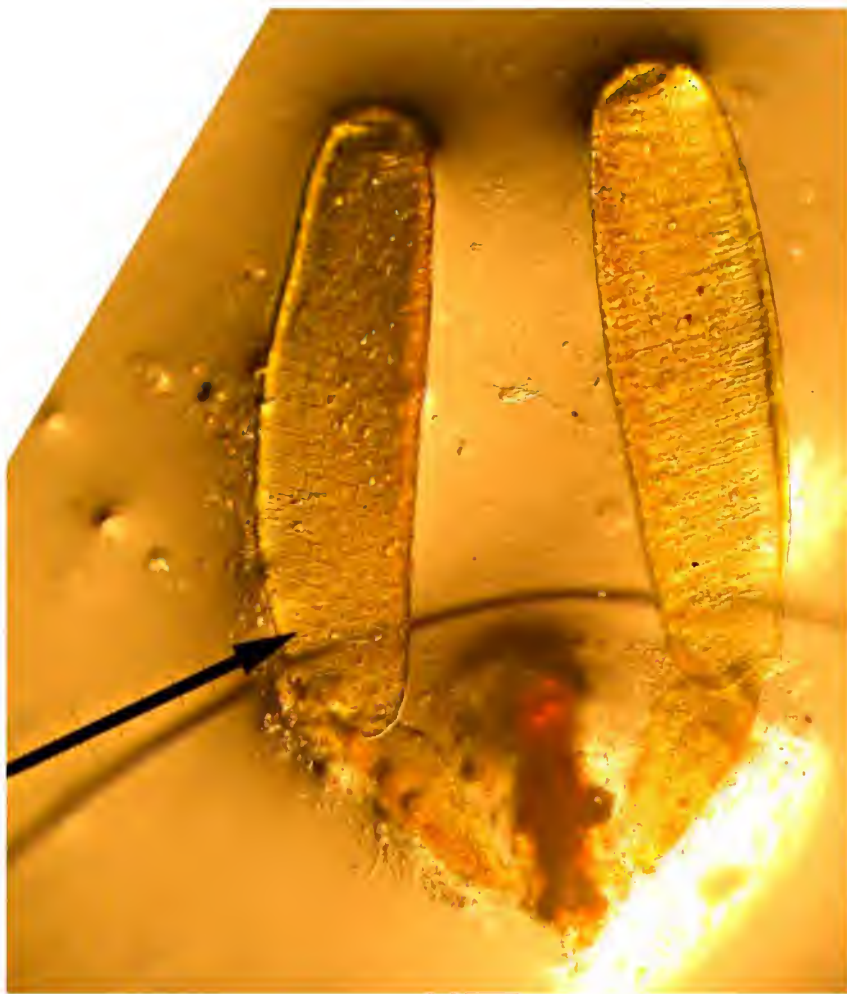
Translator/caudicle
type: ls/o

Pollinia inner end
type: R

Caudicle bulb: clear

Retinacula
character: S

Hoya coriacea subsp. philippinensis Kloppenburg, Siar, & Ferreras
2013



Pollinium enlarged
about 165x.

Pollinium

length	1.00 mm
widest	0.26 mm

Translator/caudicle type: ls/o

Retinaculum

length	0.40 mm
shoulder	0.10 mm
waist	0.08 mm
hip	0.11 mm
ext.	0.02 mm

Pollinia inner end type: R

Caudicle bulb: granulate

Retinacula character: E

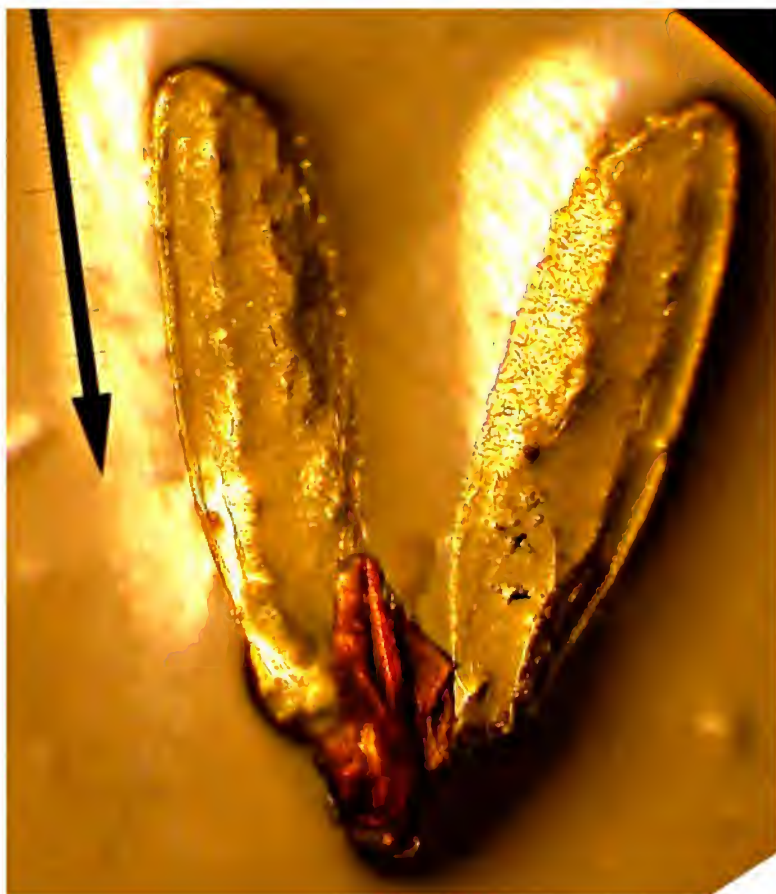
Translators

length	0.45 mm
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Caudicle bulb: deltoid



Hoya pubicorolla subsp. glabrapedicila Kloppenburg & Mendoza
(unpublished) GM #133



Retinaculum enlarged ca,
0.90x.

Pollinium

length 1.00 mm
widest 0.25 mm

Retinaculum

length 0.35 mm
shoulder 0.20 mm
waist 0.07 mm
hip 0.20 mm
ext 0.05 mm

Translator

length 0.18 mm
widest 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
ls/o

Pollinia inner end type: T

Retinacula character: HE

Hoya pruinosa Miquel 1856

flower from Ted Green. Syn. *Hoya curtisii* K & G.

Section Acanthostemma (BL) Kloppenburg Subsection Angusticarinata Kloppenburg



Pollinium

length: 0.97 mm
widest: 0.28 mm

Retinaculum

length: 0.09 mm
shoulder: 0.09 mm
waist: 0.06 mm
hip: 0.04 mm
ext.: 0.09 mm

Translators

length: 0.20 mm
depth: 0.03 mm

Caudicle

bulb diam.: 0.08 mm

Translator/caudicle

type: p/cw

Pollinia inner end

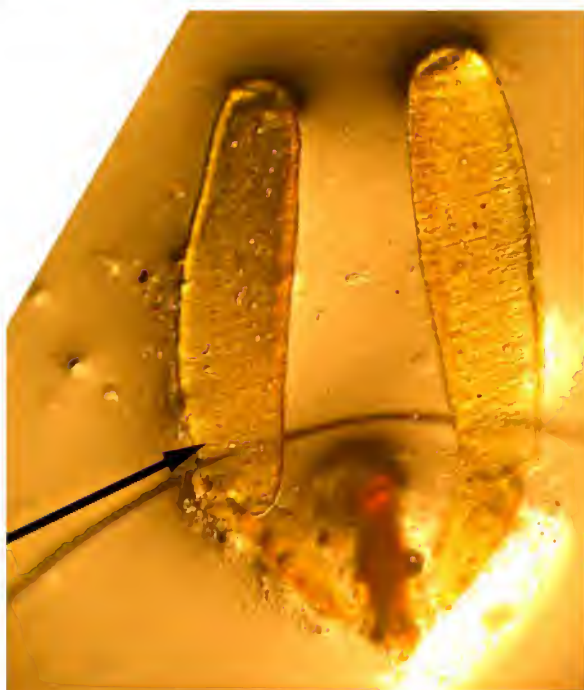
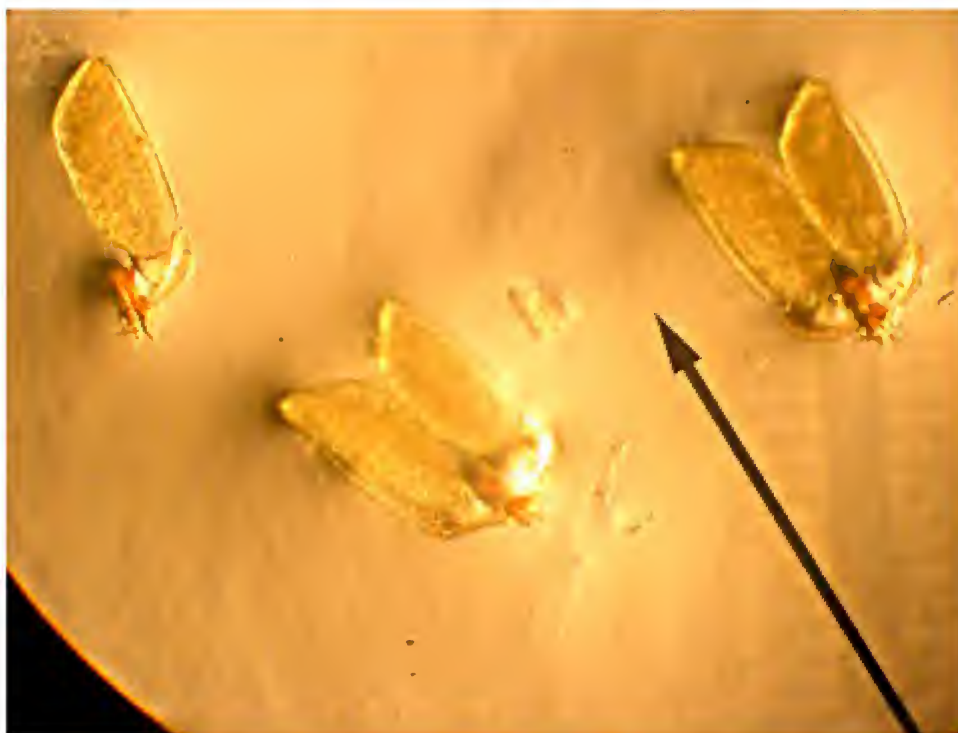
type: R

Caudicle bulb: clear C

Retinacula character:

HE ?

Hoya apoensis var. sagittaria Kloppenburg, Siar & Ferreras
2010 Type clone



Pollinium		
length		0.95 mm
widest		0.23 mm
Retinaculum		
length		0.40 mm
shoulder		0.15 mm
waist		0.10 mm
hip		0.12 mm
ext.		0.04 mm
Translator		
length		0.40 mm
depth		0.04 mm
Caudicle		
bulb diam.		0.09 mm

Translator/caudicle type: fb/cw
Caudicle bulb: granulate

Pollinia inner end type: R
Retinacula character: E

***Hoya odorata* Schlechter 1906**

Flower via TG from Batangas, collected by Prof. J. Pancho.



Magnified
approximately 110x.

Pollinium

length: 0.95 mm
widest: 0.35 mm

Retinaculum

length: 0.40 mm
shoulder: 0.30 mm
waist: 0.13 mm
hip: 0.12 mm
ext.: 0.08 mm

Translators

length: 0.17 mm
depth: 0.04 mm

Caudicle

bulb diam.: 0.10 mm

Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: Clear C

Retinacula character: S

Hoya chunii P. T. Li. 1984

Flower from Ann Wayman, clone PNG #6 Dr. Schlechter's *Hoya reticulata* 1913.



Pollinarium enlarged about 165 times.

Note: Dr. Schlechter mentions that the translators are very small. They appear here to be normal in size to the retinaculum and this type of discrepancy always makes one wonder if we have the correct species. The retinaculum here is well defined. I have not encountered the well defined undifferentiated material from the feet of the retinaculum. The pollinia are somewhat short and stubby with well-defined pellucid edge and vacuole inside from them. Here the caudicles, usually clear, seem to also be differentiated, they are very small.

Pollinarium: pellucid sterile edge wide curving slightly over top on inner apex but not extending to base apex.

Pollinia

length	0.95 mm
widest	0.40 mm

Retinacula

length	0.35 mm
shoulders	0.18 mm
waist	0.14 mm
hips	0.18 mm

Translator

length	0.18 mm
widest	0.09 mm

Caudicle

bulb diam.	0.07 mm
------------	---------

Translator/caudicle type: ls/o **Pollinia inner end type:** T **Caudicle bulb:** granulate

Retinacula character: S

Hoya obtusifolia Wight 1834

Flower from CT, Bangkok Thailand.



Magnified approximately 65x.

Pollinium

length: 0.95 mm

widest: 0.30 mm

Retinaculum

length: 0.30 mm

shoulder: 0.16 mm

waist: 0.05 mm

hip: 0.13 mm

ext.: 0.10 mm

Translators

length: 0.18 mm

depth: 0.05 mm

Caudicle

bulb diam.: ca 0.10 mm

Translator/caudicle type: p/o

Pollinia inner end type: R

Caudicle bulb: granulate

Retinacula character: HE

Hoya stoneana Kloppenburg & Siar

The origin of this species is unknown. It has been in the trade for some time as *Hoya longifolia* pubescent. Under my conditions it is a rapid growing dangling plant and a profuse bloomer. I have named this species in honor of Margie Stone, an avid hoyo enthusiast, of Eugene, Oregon, USA.



Pollinarium taken through monocular scope at 100x with digital camera.

Pollinium

length	0.95 mm
widest	0.30 mm

Retinaculum

length	0.40 mm
shoulder	0.19 mm
waist	0.09 mm
hip	0.18 mm
ext.	0.04 mm

Translators

length	0.12 mm
depth	0.05 mm

Caudicle

bulb. diam. 0.08 mm

Translator/caudicle type: ls/o

Pollinia inner end type: RT

Caudicle bulb: granulate

Retinacula character: HE

Ratio: Ret./poll. 2.2
Poll width/length 3.2

Hoya imbricata Decaisne 1844

Flower from **forma** **basisubcordata** Koorders via Maximo Wayett
Baguio, Luzon, Philippines.



Pollinium

length: 0.93 mm

widest: 0.25 mm

Retinaculum

length: 0.22 mm

shoulder: 0.18 mm

waist: 0.06 mm

hip: 0.13 mm

ext.: 0.050mm

Translators

length: 0.19 mm

depth: 0.09 mm

Caudicle

bulb diam.: 0.11 mm

Translator/caudicle type: fb/cw

Pollinia inner end type: RT

Magnified approximately 65x.

Hoya imbricata Sulawesi 93961



Pollinarium enlarged about 165x.

Pollinia

length	0.43 mm
widest	0.16 mm

Retinaculum

length	0.13 mm
shoulder	0.07 mm
waist	0.05 mm
hip	0.07 mm
ext.	0.03 mm

Translator

length	0.22 mm
depth	variable

Caudicle

bulb diam.	0.07 mm
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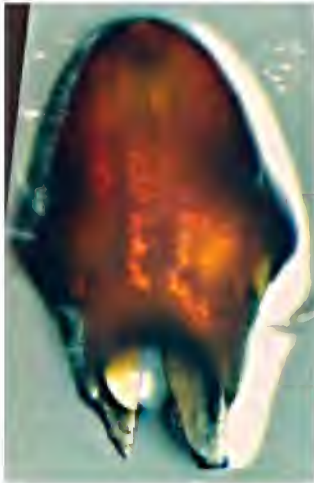
Translator/caudicle type: t/cw

Retinacula character: S

There is in the Central Sulawesi area, observed and collected in 1994 a species with similar measurements and characteristics which David Kleijn and Donkelaar have placed as the above species. Their article was published in Blumea in 2001. This is probably correct but I reserve comment on the rest of their assertions regarding this species and past works: There is a large discrepancy in the pollinia length.

Hoya darwinii Loher 1910

Flowered in Hawaii via TG.



The retinaculum enlarged about 83x. This is a large structure in a large flower.

Retinacula

length	0.57 mm
shoulder	0.50 mm
no definite waist or hips.	
extensions	0.21 mm

Translator/caudicle type: ls/o ?



Pollinia enlarged about 82x. Dr. Rintz felt this species and *Hoya mitrata* Kerr lacked pellucid edges but both of these species do have rudimentary edges. Visible here along the right side. The outer apex is very wide and rounded narrowing to the rounded inner apex.

Pollinia

length	0.92 mm
widest	0.42 mm

The pellucid edge does not appear to cover the outer apex but ends abruptly before reaching the apex but extends well down the right outer edge.

Pollinia inner end type: R

Retinacula character: R

Hoya Lazaroï Kloppenburg & Siar 2007



Pollinarium enlarged about 100x.
And to the right a little less.



Pollinium

length 0.92 mm
widest 0.37 mm

Retinaculum

length 0.45 mm
shoulders 0.38 mm
waist 0.20 mm
tapers to end
extensions 0.15 mm

Translators

length 0.23 mm
depth 0.04 mm

Caudicle

bulb diam. 0.13 mm

Translator/caudicle type: ls/o

Pollinia inner end type: RT

Caudicle bulb: granulate

Retinacula character: S

Hoya skinneriana Kloppenburg & Siar
as D.D.'s Big One Clone via Jerry Williams, Vista CA., USA.



Pollinarium enlarged
about 165x. This is a large
pollinarium.

Pollinia

length	0.92 mm
widest	0.26 mm

Retinaculum

length	0.40 mm
shoulder	0.14 mm
waist	0.10 mm
hip	0.15 mm
ext.	0.10 mm

Translator

length	0.07 mm
depth	0.02 mm

Caudicle

bulb	0.09 mm
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Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: granulate

Retinacula character: R

Hoya sp. UC #18041

as *Hoya odorata*



Pollinarium enlarged about 165x. Inner pollinium ends rounded, Pellucid edge extends all the way to the base, Retinaculum with long narrow rounded head and nearly the same width all the way down, translators connected well down.

Pollinium

length	0.92 mm
widest	0.29 mm

Retinaculum

length	0.44 mm
widest	0.17 mm
extensions	0.04 mm

Translator/caudicle type: p/o

Pollinia inner end type: R

Caudicle bulb: granulate

Retinacula character: E

This specimen is like (UC) 13176 and maybe (UC) 29638 and (UC) 13860.



A complete pollinarium expanded to the size of the above picture. This shows the typical retinaculum of this species. Translators attached well down on the retinaculum.

Hoya mitrata Kerr 1940
Flower from CT, Thailand.



This is a very large pollinarium, and very distinctive. Here enlarged about 65x. This species has the largest retinaculum I have studied (see “Hoya Pollinarium A Photographic Study by Dale Kloppenburg”). Kerr’s drawing shows no pellucid edge on the pollinia and Rintz says the pollinia is wingless (no pellucid edge), but this and *H. darwinii* Loher both have this edge present although in a diminutive form along the central outer edge of each pollinia.



Here is another view of the pollinium edge enlarged about 160x. I suppose it is possible to interpret that there is no pellucid edge her. What I see, however is a lone structure jutting from the edge of the pollinium covering about $\frac{1}{2}$ of the edge. On the right hand pollinium on the above picture you will see that it is here that the pollen tubes starting to emerge, first from the lower edge of this structure, as they do in all other hoyia species.

Pollinarium: very large retinaculum and unusual pollinia. Short translators from below the broadened head at the waist area.

Pollinia

length	0.90 mm
widest	0.32 mm

Retinaculum

length	0.45 mm
shoulder	0.49 mm

Head very broadly rounded with flaring shoulder area.

waist	0.29 mm
hip	0.30 mm
extensions	0.25 mm long.

Translators

length	0.19 mm
depth	0.03 mm

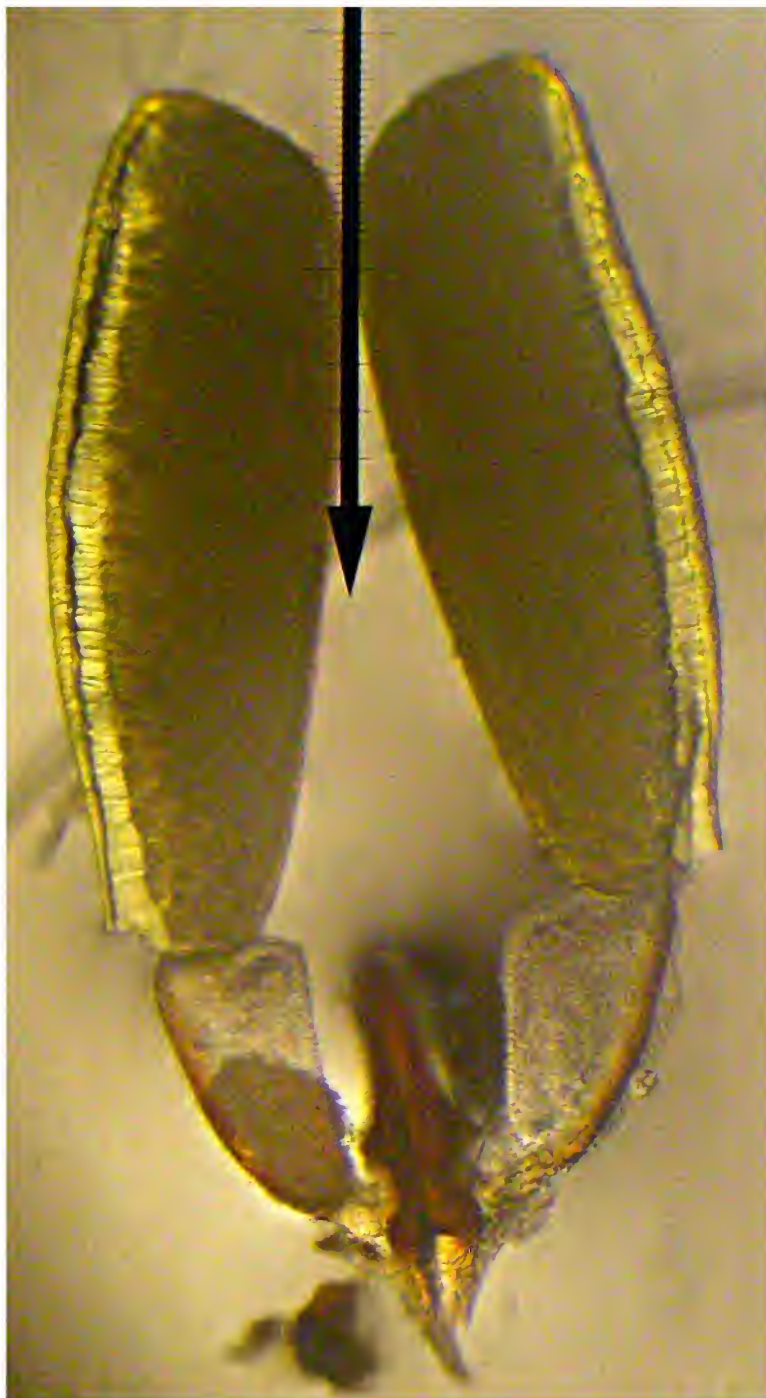
Caudicle Somewhat linear with small bulbous end. Diameter about 0.07 mm

Translator/caudicle type: p/o

Pollinia inner end type: R

Retinacula character: R

Hoya cf. coriacea Toba TG



Pollinarium enlarged ca. 110x.

Pollinium

length 0.90 mm
widest 0.34 mm

Retinaculum

length 0.31 mm
shoulder 0.15 mm
waist 0.09 mm
hip 0.13 mm
extensions 0.09 mm

Translator

length 0.42 mm
wide 0.04 mm

Caudicle

dorsal 0.18 mm
length 0.30 mm

Translator /caudicle type:
ls/cw

Pollinia inner end type:
RT

Caudicle bulb: granulate

Retinacula character: R

Retinacular head long and narrow, shoulder area well down, hips with rounded surfaces. Length measurements are made from inner apex to the

crotch and do not include the extensions.

Hoya sp. salweenica

Our plant sold in commerce under this name appears to be a variant or relative of *Hoya carnososa* R. Brown. It does not fit the type material in several critical details, although from the same geographical area. Flowers from Ted Green, Hawaii



Pollinarium enlarged about 165x. This is a large pollinarium.

Pollinia

length	0.90 mm
widest	0.26 mm

Retinaculum

length	0.48 mm
shoulders	0.19 mm
waist	0.08 mm
hips	0.10 mm
extensions	0.08 mm

Translator

length	0.15 mm
depth	0.03 mm
width	0.02 mm

Caudicle

bulb diam. 0.08 mm

Translator/caudicle
type: ls/o

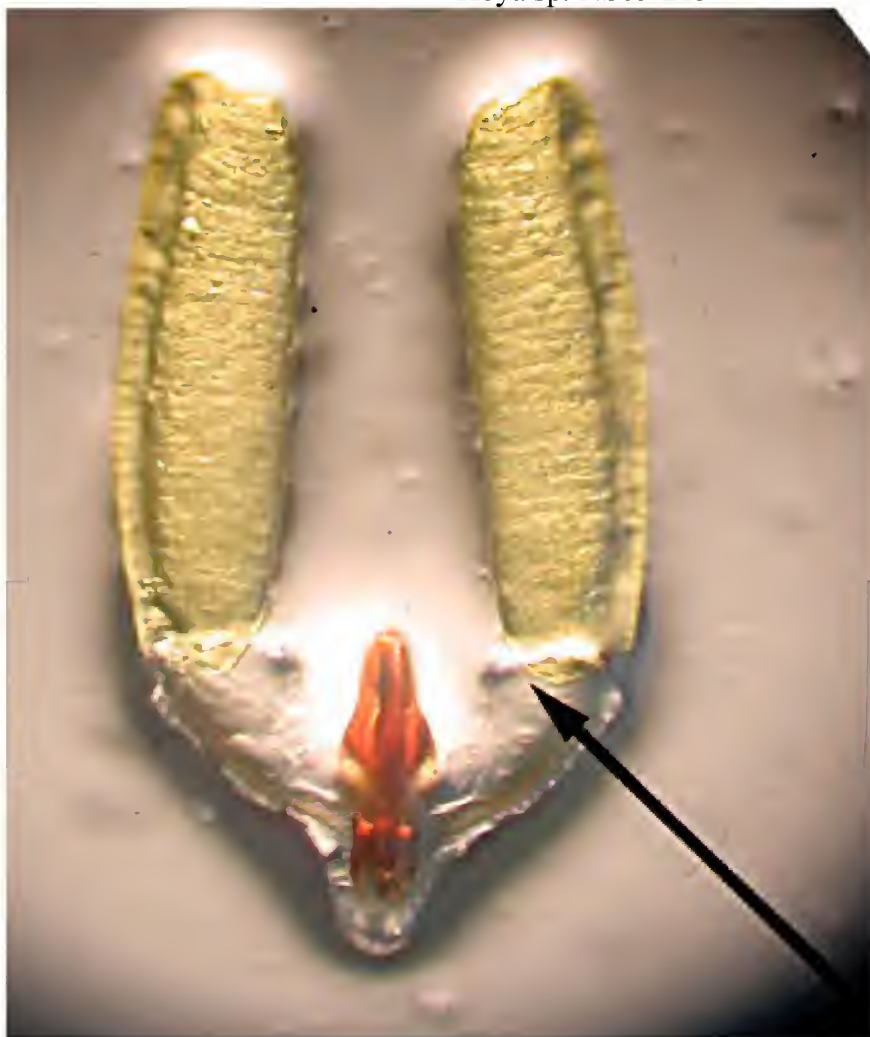
Pollinia inner end type:
R

Caudicle bulb: clear

Retinacula character: R

Hoya cf. halconensis Kloppenburg 1990

Hoya sp. NS05-213



Pollinarium
enlarged. Scale
arrow length 0.10
mm long small
marks on shaft 0.01
mm long.

Pollinarium:

length	0.89 mm long.
widest	0.26 mm

Retinaculum

length	0.34 mm
shoulder	0.14 mm
waist	0.05 mm
hip	0.09 mm

Translators

length	0.40 mm
width	0.02 mm

Translator/caudicle type: l/cw

Pollinia inner end type: T

Caudicle bulb diam. 0.18 mm

Caudicle bulb: clear

Retinacula character: HE

Hoya meliflua Blanco ex Merrill 1837
Flower via Ann Wayman, Central Point, OR. USA.



Magnified approximately 165x.

Pollinium

length: 0.89 mm
widest: 0.27 mm

Retinaculum

length: 0.34 mm
shoulder: 0.22 mm
waist: 0.06 mm
hip: 0.10 mm
ext.: 0.10 mm

Translators

length: 0.20 mm
depth: 0.03 mm

Caudicle

bulb diam.: 0.05 mm

Translator/caudicle type: ls/o

Pollinia inner end type: T

Retinacula character: S

Hoya cf. halconensis Kloppenburg 1990

Hoya sp. NS05-225 Flowers given to me in IRI UPLB by Dr. Monina Siar 2006

This is the same sp. as NS05-213



Pollinarium enlarged about 165x. Reticle arrow is 0.10 mm long and head 0.05 mm wide, marks on the stem 0.05 mm long.

Pollinium

length 0.88 mm
widest 0.25 mm

Retinaculum

length 0.30 mm
head 0.14 mm
shoulder 0.15 mm
waist 0.09 mm
hip 0.10 mm
ext. 0.04 mm

Translators

length 0.30 mm
depth 0.02 mm

Caudicle

Cw 0.18 mm top

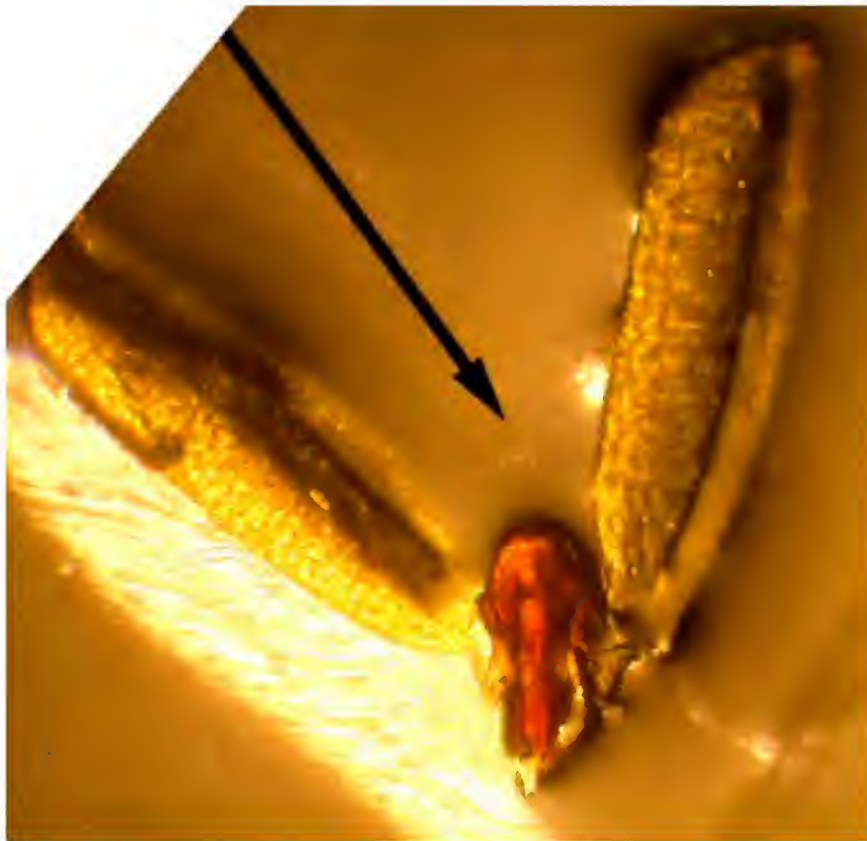
Translator/caudicle
type: l/cw

Pollinia inner end
type: T

Caudicle bulb: granulate

Retinacula character: R

Hoya celata Kloppenburg, Siar, Mendoza Cajano Guevarra &
Carandang 2013



Pollinarium
enlarged about
165x.

Pollinium

length 0.87 mm
widest 0.25 mm

Retinaculum

length 0.33 mm
shoulder 0.20 mm
waist 0.16 mm
hip 0.20 mm
ext. 0.05 mm

Translators

length 0.10 mm
depth 0.04 mm

Caudicle

bulb. dia. 0.06 mm

Translator/caudicle type: ls/o

Pollinia inner end type: RT

Retinacula character: R

Ratio: pol./width 2.6
Pol./ret. 2.3

Hoya darwinii subsp. mabilogensis Kloppenburg & Mendoza
(unpublished) GM #106



Pollinarium enlarged ca. 80x.

Pollinium

length 0.87 mm
widest 0.40 mm

Retinaculum

length 0.62 mm
widest 0.54 mm
extensions 0.18 mm

Translators

length 0.40 mm
width 0.03 mm

Caudicle

bulb 0.17 mm

Retinacular extensions
somewhat spade shaped



Photo shows the translators and caudicles better.

The pellucid edges are short and narrow, difficult to differentiate. The translators are almost intermingled with the “cw” style caudicles that appear somewhat granulate surfaced.

The retinaculum below is creased all the way down the center.

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: R

Hoya mindorensis subsp. ehersuta Kloppenburg & Mendoza
(unpublished) GM #197



Pollinarium enlarged ca. 165x

Pollinium

length 0.87 mm
widest 0.28 mm

Retinaculum

length 0.23 mm
widest 0.27 mm
ext. 0.15 mm

Translator

length 0.20 mm
widest 0.04 mm

Caudicle

oval 0.15 x 0.06 mm

Translator caudicle type:
ls/r

Pollinia apex type: R

Caudicle bulb: granulate
G

Retinacula character:
HH/LS

With most of the subspecies in this group the legs of the retinaculum are rolled under the lower edge so difficult to delineate. Most have rounded heads but with 2 protrusions further back so

often hidden here both legs and dorsal modifications show. Here the caudicles show the granular surface (much like a dried snake skin). The supporting translators are dark with convex dorsal surfaces.

Hoya meliflua subsp. fraterna Green 1995

flower from clone in southern CA.



Pollinarium enlarged about 65 times. This species has a large pollinarium. The pollinia are long, relatively narrow with a well defined retinaculum, short translators and small caudicles.

Pollinium

length: 0.87 mm
widest: 0.27 mm

Retinaculum

length: 0.37 mm
shoulder: 0.19 mm
waist: 0.08 mm
hip: 0.17 mm
ext.: 0.06 mm

Translators

length: 0.13 mm
depth: 0.04 mm

Caudicle

bulb. diam.: 0.08 mm

Translator/caudicle type: ls/o

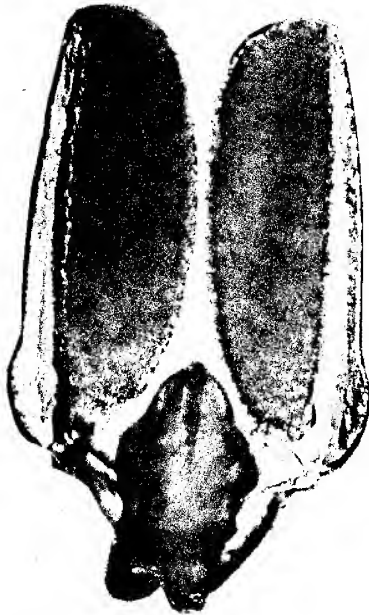
Pollinia inner end type: T

Retinacula character: S

Hoya odorata Schlechter 1906

Clone via TG flowered in Hawaii.

Magnified approximately 65x



Pollinium

length: 0.87 mm
widest: 0.32 mm

Retinaculum

length: 0.45 mm
shoulder: 0.27 mm
waist: 0.19 mm
hip: 0.20 mm
ext.: 0.09 mm

Translators

length: 0.30 mm
depth: 0.03 mm

Caudicle

bulb. diam.: 0.12 mm

Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: clear

Retinacula character: R

Hoya megalaster Warburg 1901

Flower collected at Ted Green's October 2003. Data and photos 25 November 2003.



Pollinarium enlarged about 165x. Pollinia inner lobes are rounded. The Retinaculum has short horns on the head curved backward and the center here was an open cleft, extensions curved inward near the apex. Translators are short, somewhat tubular and the clear caudicles are small and appear to ride in front and on top of the translator arms (not in the groove on top. They are also relatively small.

Pollinium

length	0.87 mm
widest	0.32 mm

Pollinia inner end type: R

Retinaculum

length	0.35 mm
shoulder	0.30 mm
ext	0.10 mm

Caudicle bulb: clear

Translators

length	0.15 mm
depth	0.01 mm

Translator/caudicle type: ls/o

Caudicle

bulb diam	0.15 mm
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Retinacula character: S

Hoya loyceandrewsiae Green 1995

Type clone



Pollinium: large pollinia, free ends taper inward slightly and are rounded, base narrows and is rounded. Pellucid edge almost extends to the caudicle. Retinaculum the rounded head broad shoulders and tapering from there to the apical end. Translators narrowing outward; caudicle well formed into the typical comma shape.

Pollinia

length	0.85 mm
widest	0.27 mm

Retinaculum

length	0.32 mm
long to crotch.	
shoulder.	0.20 mm

Translators

length	0.15 mm
(outside the retinaculum)	

Caudicle

bulbous portion	0.07 mm
-----------------	---------

Translator/caudicle type:
ls/o

Pollinia inner end type: RT

Retinacula character: R

View of the pollinarium enlarged about 165x.

Hoya irisae Ferreras, Kloppenburg & Tandang 2014



Pollinarium enlarged ca. 70x.

Pollinia

length 0.85 mm
widest 0.35 mm

Retinaculum

length 0.91 mm
widest 0.07 mm

Translator

length 0.21 mm
widest 0.07 mm

Caudicle

bulb diam 0.15 x 0.20 mm

Translator/caudicle type: ls/o

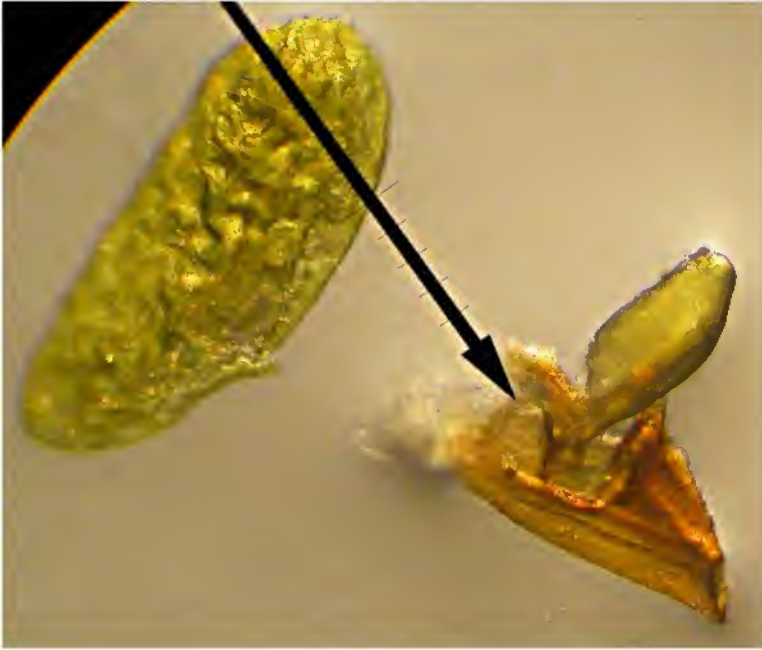
Pollinia inner end type: R



More photos of the pollinarium structures, I am unable to determine at this time if the retinaculum has turned on its axis. The right side photo would indicate that it has since at the top it appears there may be extensions.

Caudicle bulb: clear

Retinacula character: HE



The pellucid edges to the pollinia are very faint, nevertheless they are present. The pollen grains are large end structured.

To the lower right the retinaculum with the translator and caudicle attached showing how it enters the side of the retinaculum. (Photo enlarged at ca. 80x.)

Hoya buotii Kloppenburg 2002

Type clone



Pollinarium enlarged about 65x. This is a large pollinarium with a small retinaculum, typical of many of Dr. Schlechter's species.

Pollinium

length	0.85 mm
widest	0.30 mm

Retinaculum

length	0.27 mm
shoulder	0.15 mm
waist	0.08 mm
hip	0.10 mm
extensions	0.04 mm

Translators

length	0.35 mm
depth	0.03 mm

Caudicle

bulb diameter	0.13 mm
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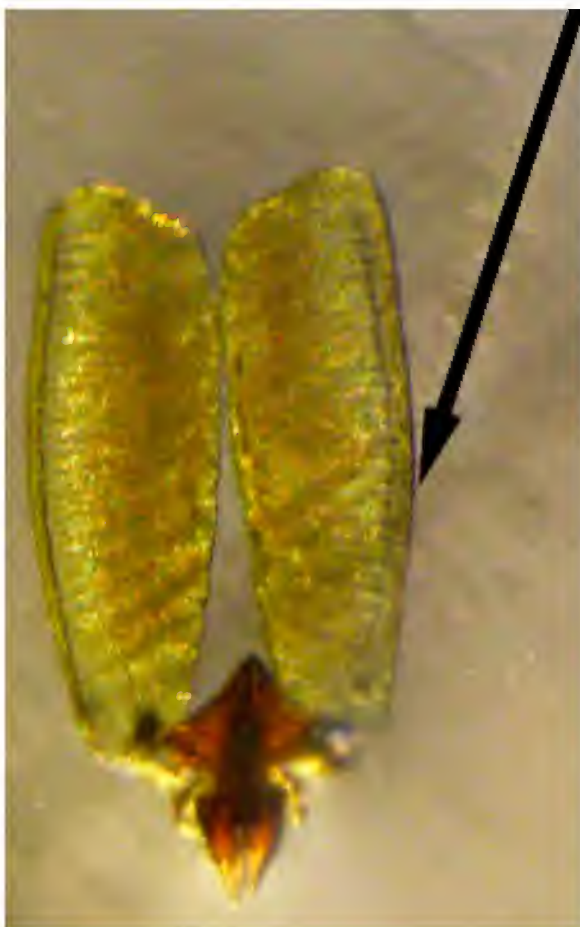
Translator/caudicle type: ls/o

Pollinia apex type: R

Retinacula character: R

This species has pollinia nearly as long as *Hoya meliflua subspecies fraterna* Green, but the retinaculum is as small as in the species *Hoya lacunosa* Blume.

Hoya meliflua subsp. nuevaensis Kloppenburg & Mendoza
(unpublished) GM #191



Pollinarium enlarged 90x.

Pollinium

length	0.84 mm
widest	0.24 mm

Retinaculum

length	0.23 mm
shoulder	0.22 mm
waist	0.06 mm
hip	0.11 mm
ext	0.05 mm

Translator

length	0.11 mm
widest	0.03 mm

Caudicle

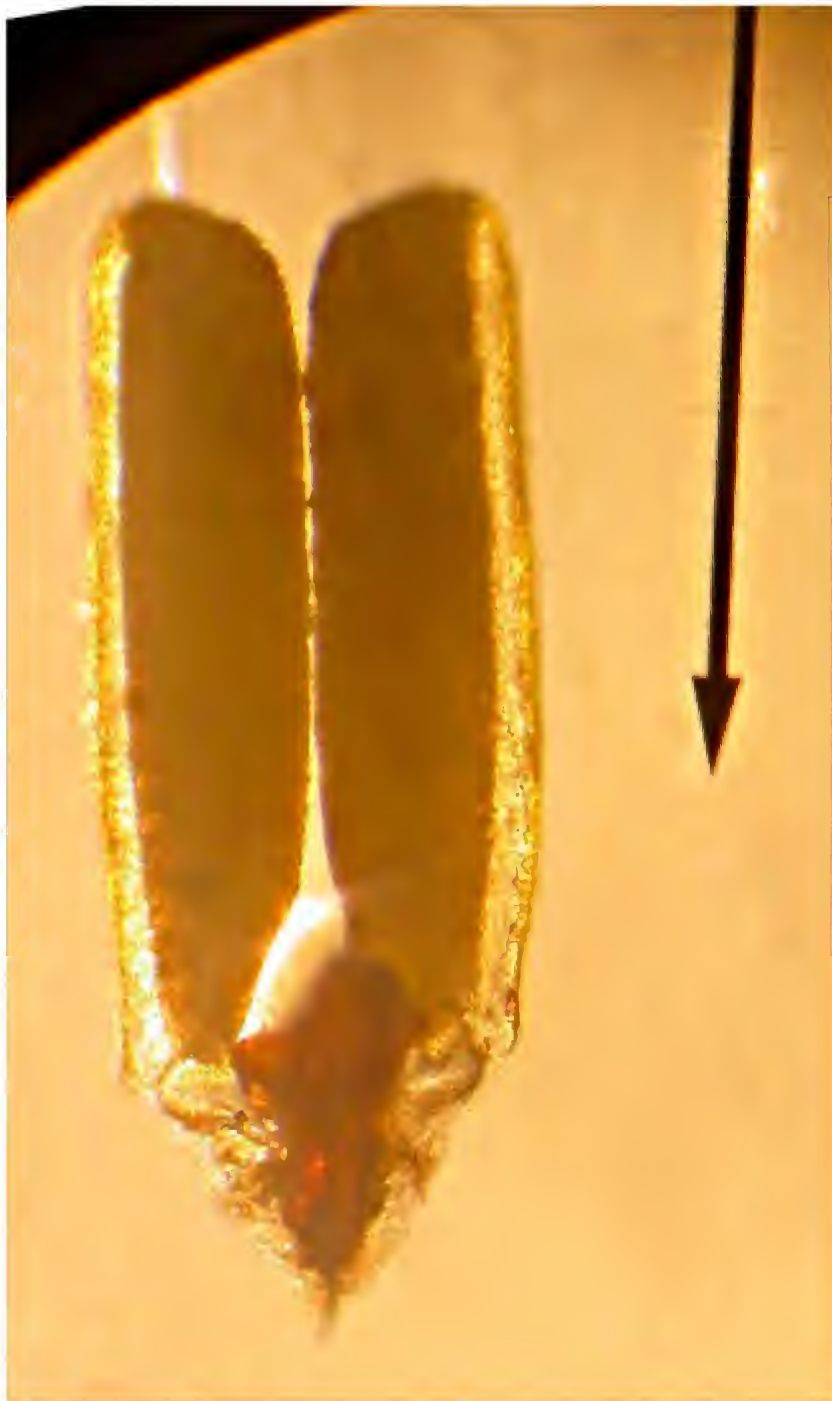
bulb	0.08 mm
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Translator/caudicle type: p/o or possibly
ls/o

Pollinia apex type: T

Retinacula character: S

Hoya pubicorolla subsp. anthracina Kloppenburg, Ferreras & Mendoza 2013



Pollinarium enlarged
ca. 180x.

Pollinium

length 0.83 mm
widest 0.20 mm

Retinaculum

length 0.26 mm
shoulder 0.20 mm
waist 0.10 mm
hip 0.16 mm
ext. 0.05 mm

Translator

length 0.10 mm
depth 0.03 mm

Caudicle

bulb diam. 0.08 mm

Translator/Caudicle

Type: d/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula
character: S

Ratios: p/w 4.2
p/r 5.2

Flowers in globose clusters of ca. 28 flowers.

Hoya desvieuxensis T. Green & Kloppenburg 2011



Translator/caudicle:
ls/o

Pollinia inner ends: T
(out)

Retinacula: ?

Pollinarium about 160x. enlarged

Pollinium

length 0.83 mm.
widest 0.14 mm.

Translator

length 0.11 mm.

Caudicle bulb diameter 0.07 mm. granulate survice

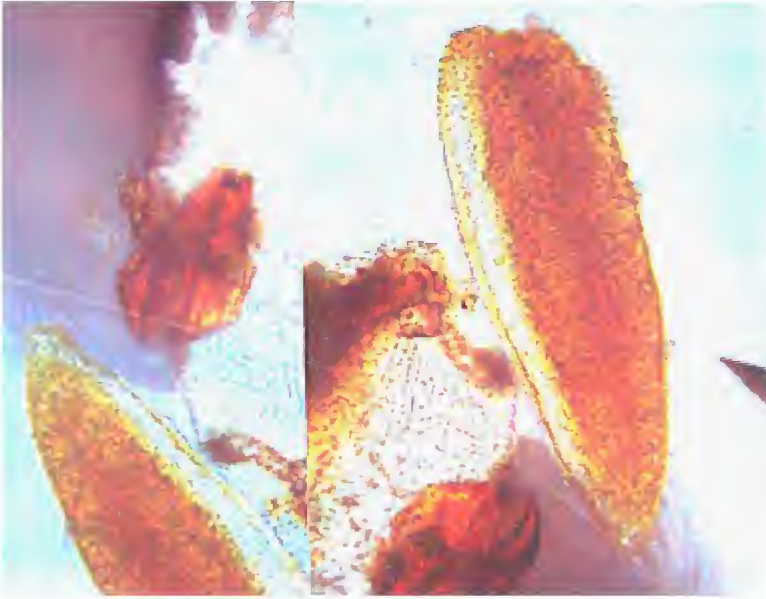
Retinaculum

length 0.16 mm.
shoulder 0.09 mm.
waist 0.04 mm.
hip 0.08 mm.
ext 0.04 mm.

Hoya sp. PNH 9385 1913

Copies at A/2 BO, US, L, BS

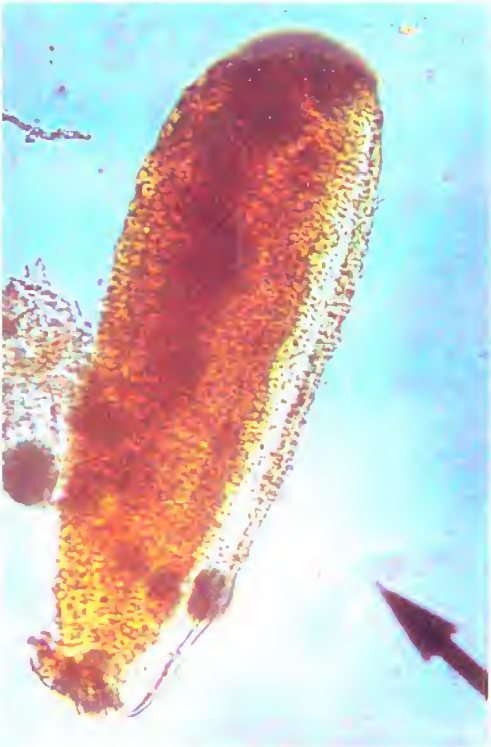
Roll 242-243, 3/31/99 most likely *H. meliflua* Merrill



Two photos of pollinarium. Pollinia were not attached to the caudicle, some pollinia had germinated (pollen tubes present).

Retinaculum

length	0.24 mm
shoulder	0.14 mm



Pollinia

length	0.82 mm
widest	0.27 mm

Hoya pubicorolla Kloppenburg 2013

Flowered in Fresno CA clone from Dexter Heuschkel, Manila, Philippines.

Previously labeled *H. pubicalyx* Merrill 1918



Magnified approximately
165x.

Pollinium

length: 0.81 mm

widest: 0.23 mm

Retinaculum

length: 0.27 mm

shoulder: 0.22 mm

waist: 0.09 mm

hip: 0.10 mm

ext.: 0.08 mm

Translators

length: 0.15 mm

depth: 0.02 mm

Caudicle

bulb diam.: 0.11 mm

Translator/caudicle type: ls/o

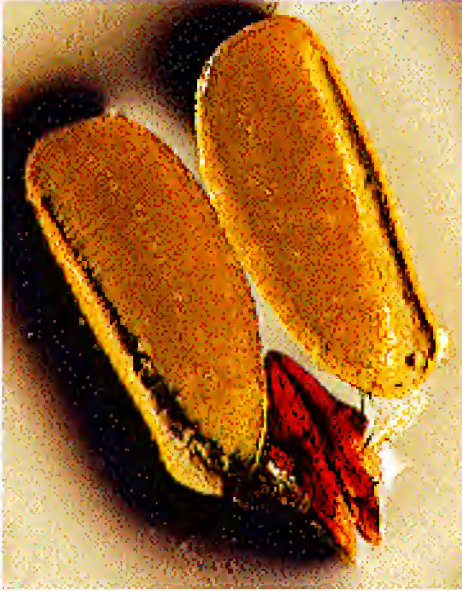
Pollinia end type: T

Caudicle bulb: clear

Retinacula character: S

Hoya australis subsp. australis

IML 6 Silver Valley, Qlds. Australia



Pollinarium enlarged about 66x. This is a large pollinarium with the distinctive wide vacuole near the inner apex of the pollinia. The pollinia is entirely different from that found on the *H. rupicola* Hill, found at Talc head, Darwin, Australia.

Pollinium

length	0.81 mm
widest	0.35 mm

Retinaculum

length	0.44 mm
7shoulder	0.22 mm
waist ca.	0.11 mm
hip	0.15 mm

Translators

length	0.20 mm
depth	0.07 mm

Caudicle

bulb diam.	0.09 mm
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Translator/caudicle type: ls/o

Pollinia end type: R

Caudicle bulb: clear

Retinacula character: HE

Hoya sp. NS05-231 Mt. Halcon, Philippines

via Torill Nyhuus march 2007



Pollinarium enlarged about 165x. The retinaculum is turned edgewise but appears to have a long head area translator and caudicle entering below the hip area. Translator is very narrow and caudicle bulb surface is cupped (structured). Pollinium is long, narrow and inner apex is rounded.

Pollinium

length	0.81 mm
widest	0.24 mm

Retinacula

length	0.38 mm
shoulders	0.30 mm
waist	0.14 mm
hip	0.18 mm
ext.	0.06 mm

Translator

length	0.33 mm
widest	0.01 mm

Caudicle

bulb diam.	0.15 mm
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Translator/caudicle type: l/cw

Pollinia inner end type: RT

Retinacula character: HE

Hoya meliflua subsp. darastanensis Kloppenburg & Mendoza
(unpublished) GM #190



Pollinarium enlarged 120x.

Pollinium

length 0.80 mm
widest 0.25 mm

Retinacula

length 0.21 mm
shoulder 0.26 mm
waist 0.10 mm
hip 0.15 mm
ext. 0.12 mm

Translator

length 0.16 mm
widest 0.09 mm

Caudicle

bulb 0.10 mm

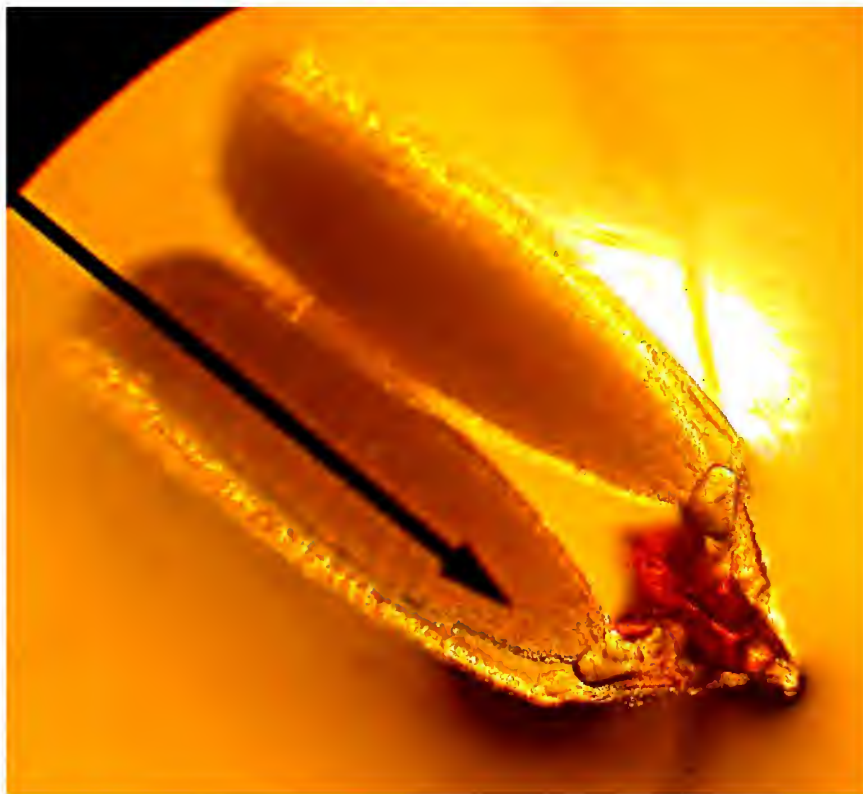
Translator/caudicle type: p/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: R

Hoya meliflua subsp. mendozae Kloppenburg
(unpublished) GM #34



Pollinarium
enlarged ca. 100x.

Pollinium

length 0.80 mm
widest 0.25 mm

Retinaculum

length 0.25 mm
shoulder 0.18 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.05 mm

Translator

length 0.15 mm
depth 0.05 mm

Caudicle

bulb diam. 0.06 mm
x 0.08 mm, oval
shaped here.

Translator/caudicle type: ls/o

Pollinia end type: RT

Caudicle bulb: granulate G

Retinacula character: HU

Hoya davaoensis Kloppenburg 2013

Pollinarium

Pollinium

length	0.80 mm
widest	0.25 mm

Retinaculum

length	0.20 mm
shoulder	0.15 mm
waist	0.10 mm
hip	0.12 mm
ext.	0.03 mm

Translators

length	0.15 mm
depth	0.04 mm

Caudicle

bulb diam.

Translator/caudicle type: d/o

Pollinia end type: RT

Retinacula character: S





Hoya thompsonii Hooker f. 1883

Flower via C.T. from Thailand.

Magnified approximately 165x.



Pollinium

length 0.80 mm
widest 0.25 mm

Retinaculum

length: 0.29 mm
shoulder 0.18 mm
waist 0.07 mm
hip 0.13 mm
extensions 0.03 mm

Translators

length 0.18 mm
depth 0.02 mm

Caudicle

bulb diameter 0.06 mm

Translator/caudicle type:
ls/o

Pollinia end type: F

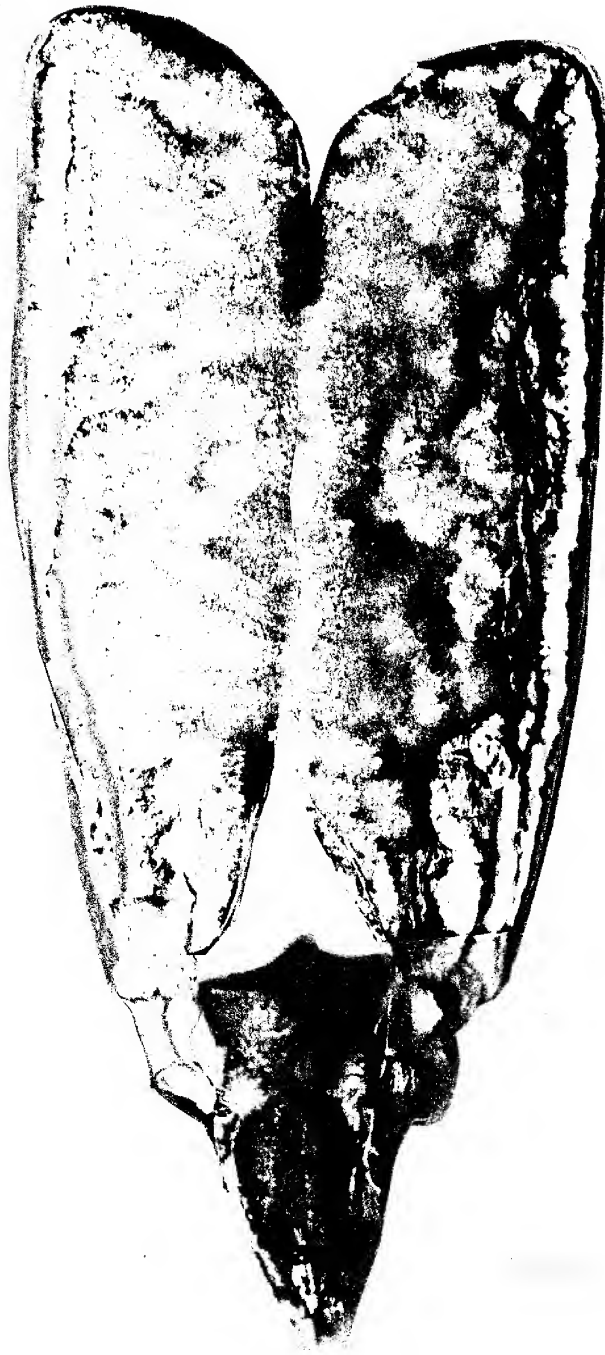
Caudicle Type: C

Retinacula character: HE

Hoya motoskei Teijsmann & Binnend 1852

Flowered at Fresno, CA., USA.

IML 50 'Thailand White'.



Magnified
approximately 165x.

Pollinium

length: 0.80 mm

widest: 0.25 mm

Retinaculum

length: 0.27 mm

shoulder: 0.18 mm

waist: 0.08 mm

hip: 0.10 mm

ext.: 0.05 mm

Translators

length: 0.12 mm

depth: 0.04 mm

Caudicle

bulb. diam.: 0.08 mm

Translator/caudicle type:

ls/o

Pollinia end type: T

Retinacula character: S

Hoya sp. UC 49272

Collected by Ramos & Edano at Mati, Davao, Mindanao, Philippines, March -April
1927, Roll 73

Flower red salmon color in open places in forest stream, low altitude. this is not *H. meliflua* Merrill?



Pollinarium

Pollinium

length	0.80 mm
widest	0.25 mm

Retinaculum

length	0.20 mm
shoulder	0.15 mm
waist	0.10 mm
hip	0.12 mm
ext.	0.03 mm

Translators

length	0.15 mm
depth	0.04 mm

Caudicle

bulb diam.

Translator/caudicle type: ls/o

Pollinia end type: RT

Retinacula character: S



Hoya sp. UC 49238

Collected by Ramos/Edano at Mati Davao, Mindanao, Philippines 1927. Roll 54 Draw 70



Composite Photos
of the pollinarium
here and below.

Pollinium

length 0.80 mm
widest 0.32 mm

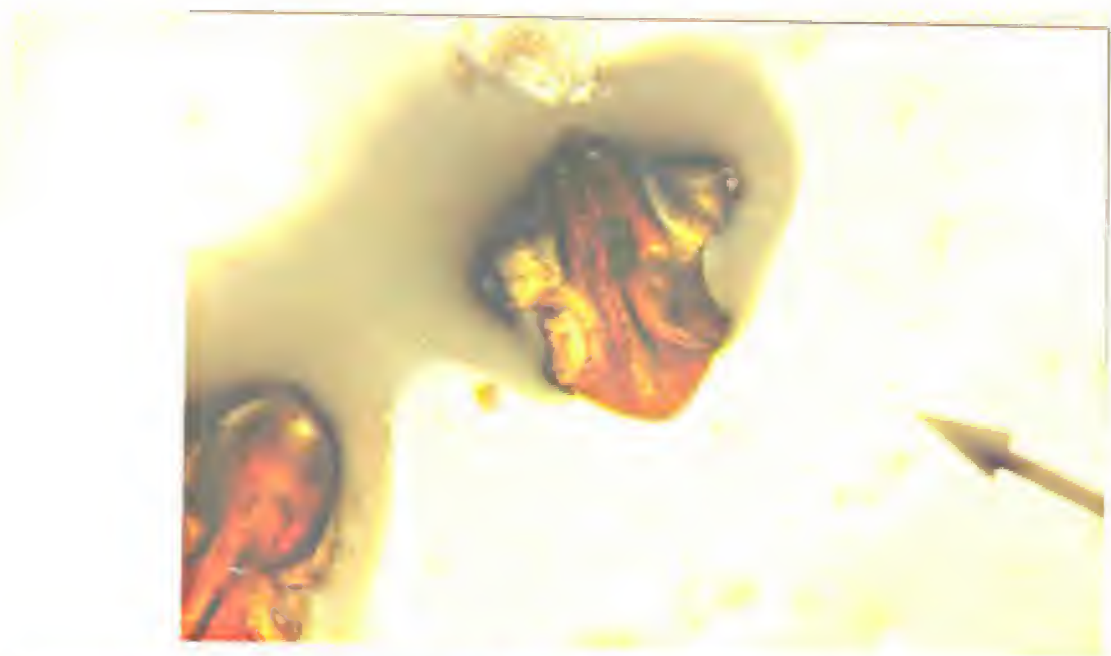
Retinaculum

length 0.38 mm
should. 0.20 mm

Translator/caudicle type: ls/o

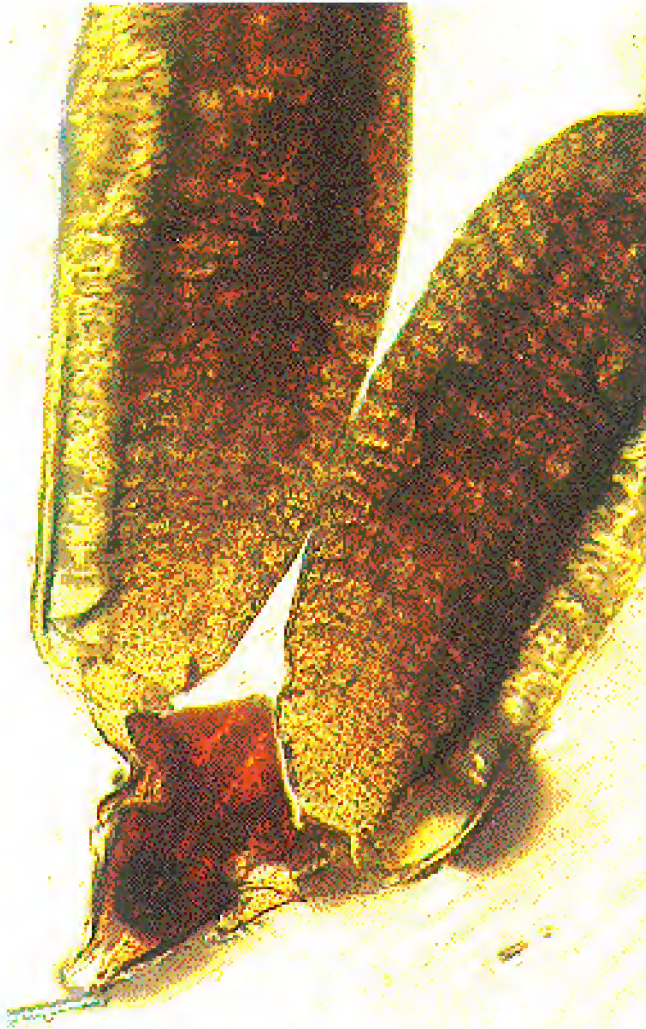
Pollinia end type: RT

Retinacula character: R ?



Hoya excavata Teijsmann & Binnendijk 1863

Pollinarium from flower via Ted Green.



The pollinarium enlarged approximately 165x.

Note: how the retinaculum has somewhat winged shoulders a definite waist area, wider hip area. Here the translators concave top is visible, this supports the usually clear caudicles. In this species the sterile pellucid edge of the pollinia is well developed and seems to extend clear around the end of the pollinia adjacent to the retinaculum. There is a wide vacuole area just inside the sterile edge. Pollen is thick and dense.

Translator/caudicle type: ls/o

Pollinia end type: R

Caudicle bulb: G

Retinacula character: S

Pollinia

length	0.79 mm
widest	0.27 mm

Retinaculum

length	0.27 mm
shoulders	0.18 mm
waist	0.07 mm
hips	0.11 mm

Translator

length	0.11 mm
edge	0.02 mm wide.

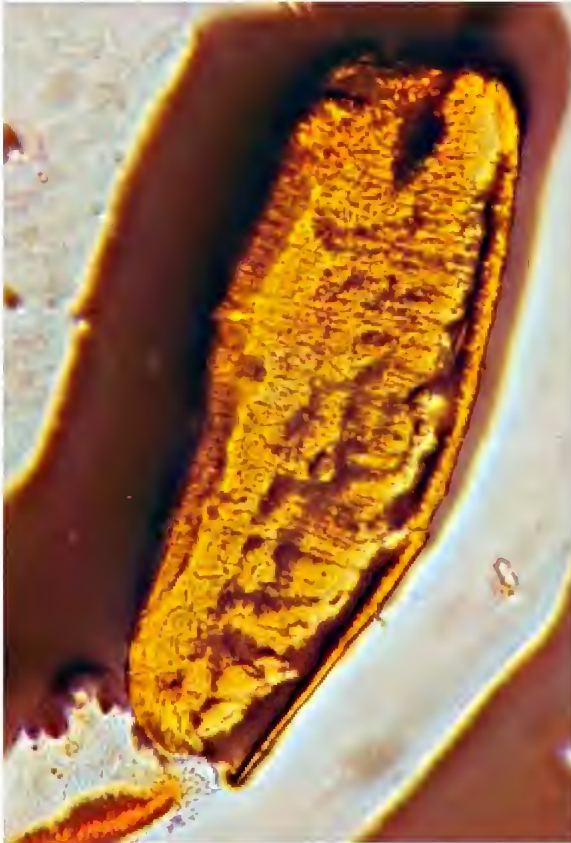
Caudicles approx.

	0.05 mm in diameter.
--	----------------------

Hoya fraterna Blume 1849



This is a large pollinarium, here enlarged about 32x. Translator arms are narrow and long attached well down on the retinaculum., actually they seem to run down the side of the retinaculum below the waist to the extensions. Caudicles are club shaped with the wide end near the pollinia base.



View of the pollinia and attachment to the caudicle enlarged about 165x.

Pollinia

length	0.79 mm
widest	0.23 mm

Retinaculum

length	0.35 mm
shoulder	0.14 mm
waist	no differences
hips	no differences
extensions	0.03 mm

Translator

length	0.03 mm
depth	0.02 mm

Caudicle

top	0.15 mm wide
length	0.21 mm without tail.



Translator/caudicle type: l/cw

Pollinia end type: R

Caudicle bulb: G

Retinacula character: HE

Another view showing the translator and caudicle etc. enlarged about ½ the size of the above. Here you can see how the thin translator seems to run down the side to the extensions.

Hoya arnottiana Wight 1843

Flower from Ann Wayman



Pollinarium enlarged about 65x. The pollinia are uniformly broad with inner apices rounded, the pellucid edge seems to end above the caudicle attachment area, the vacuole just inside from the sterile edge is well developed. The retinaculum is small and relatively broad. Translators are short Caudicles hardly visible at this magnification.

Pollinarium:

Pollinium

length 0.78 mm
widest 0.30 mm Inner apex rounded, tapering inward slightly, sterile pellucid edge extends down the outer side from the inner apical area nearly to the caudicle attachment area.

Retinaculum short and squatty

length 0.19 mm
head 0.14 mm broad
waist area 0.12 mm wide
hips 0.14 mm broad.

Translators very short.

length 0.10 mm

Caudicles about 0.05 mm in diameter at attachment to the pollinium.

Translator/caudicle type: b/o

Pollinia end type: R

Retinacula character: S

Hoya sp. PNH 24031



Pollinarium enlarged about 165x

Pollinium

length	0.78 mm
widest	0.25 mm

Retinaculum

length	0.14 mm
shoulder	0.13 mm
waist	0.08 mm
hip	0.09 mm
ext.	0.04 mm

Translators

length	0.08 mm
depth	0.02 mm

Caudicle

bulb diam.	0.04 mm
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Translator/caudicle type: p/o

Pollinia end type: R

Caudicle bulb: G

Retinacula character: S

Hoya sp. 297 ex India

Magnified approximately 65x.



Pollinium

length: 0.77 mm
widest: 0.24 mm

Retinaculum

length: 0.27 mm
shoulder: 0.15 mm
waist: 0.06 mm
hip: 0.14 mm
ext.: 0.05 mm

Translators

length: 0.14 mm
depth: 0.03 mm

Caudicle

bulb. diam.: ?

Translator/caudicle type: ls/o

Pollinia end type: T

Retinacula character: S

Hoya sp. BSI #1

via Ann Wayman.



Magnified approximately 165x.

Pollinium

length: 0.77 mm
widest: 0.20 mm

Retinaculum

length: 0.33 mm
shoulder: 0.19 mm
waist: 0.11 mm
hip: 0.16 mm
ext.: 0.06 mm

Translators

length: 0.16 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.05 mm

Translator/caudicle type: ls/o

Pollinia end type: R

Caudicle bulb: C

Retinacula character: R

Hoya sp. PNH 13306 Loher 1915

Collected at Montelban, Roll 241, 3/24/99



Pollinium enlarged ca. 165x.

Since the black scale is blurred exact measurements are difficult.

Pollinium

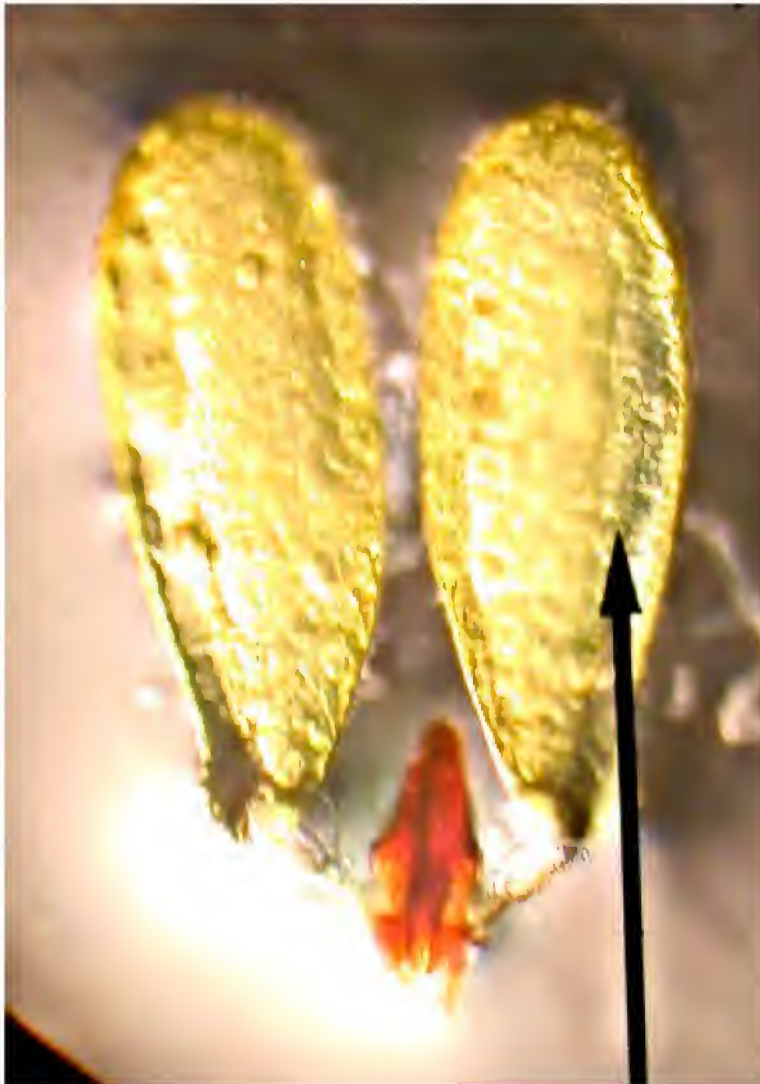
length	ca. 0.77 mm
widest	ca. 0.25 mm

The pollinia length & width are near only one other known Philippine species, i.e. what we now

Translator/caudicle type: ?/o

Pollinia end type: R

Hoya linavergarae Kloppenburg & Siar 2006



Pollinarium enlarged about 100x. Lower portion of the pollinium at the pelucid edge is expanded as in *Hoya australis*.

Pollinium

length 0.77 mm
widest 0.32 mm

Retinaculum

length 0.25 mm
shoulders 0.12 mm
waist 0.08 mm
hip 0.12 mm
ext. 0.02-0.06

mm material not fully differentiated

Translators

length 0.19 mm
depth 0.02 mm

Caudicle

bulb diam. 0.08 mm

Ret.: poll ratio 1:2.6

Translator/caudicle type: l/cw

Pollinia end type: R

Retinacula character: HE

Hoya bella Hooker 1848

Plant from San Francisco Flower Mart via David Jones



Photomicrograph of the Pollinarium enlarged approx. 65x. I believe the pollinia are slightly shriveled do to dehydration.

The retinaculum is long and narrow. The clear caudicles are very large and somewhat indented at the top at least on the left side. The translator arms are also rather long and narrow attached well down on the retinaculum.

Pollinarium:

Pollinium

length	0.77 mm
widest	0.22 mm

Retinaculum

length	0.28 mm
shoulder	0.08 mm
waist	0.06 mm
hips	0.09 mm
extensions	0.04 mm

Translators

length	0.28 mm
depth	0.05 mm

Caudicles

diameter	0.10 mm
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Translator/caudicle type: fb/cw

Pollinia end type: T

Caudicle bulb: G

Retinacula character: E

Pollinia Types 2017-1B

79. **Hoya dischorensis** Schlechter 1913
80. **Hoya acuta** Haworth 1821 ?
81. **Hoya sp. (UC) 20732 (vitiensis)**
82. **Hoya golamcoiana** Kloppenburg 1991
83. **Hoya chlorantha** Rechinger 1908
84. **Hoya chlorantha** Rechinger 1908 (My coll.)
85. W 3111 as **Hoya betchei**, determined to be **Hoya chlorantha**
86. **Hoya fetuana** Subsp. **tutuilensis** Kloppenburg 2017
87. **Hoya savaiiensis** subsp. **falealupoensis** Kloppenburg 2015
88. **Hoya acuta** Haworth 1821 (var. **greenii**)
89. **Hoya fetuana** Kloppenburg 2003
90. **Hoya seanwhistleriana** Kloppenburg 2015
91. W 8717 as **Hoya vitiensis** cf. **Hoya fetuana**
92. **Hoya shephardii** Short ex Hooker 1861
93. **Hoya cumingiana** subsp. **rezalensis** Kloppenburg, Guevarra & Carandang
94. **Hoya sp.** Matafoao Ridge Am. Samoa, Yellow
95. **Hoya** cf. **amoena** Ted Green 2014
96. **Hoya finlaysonii** Wight 1834
97. **Hoya sp. laurifolia** (not)
98. **Hoya cumingiana** subsp. **biloba** Kloppenburg & Mendoza
99. **Hoya whistlerii** Kloppenburg 2002
100. **Hoya recurvula** subsp. **bokorensis** Kloppenburg & Yap 2010
101. **Hoya meredithii** x **crassicauli**
102. **Hoya sp. Sabah, alaysia**
103. **Hoya odorata** Schlechter 1906 (a Loher sp.)
104. **Hoya sp. PNG #4**
105. **Hoya obovata** Decaisne 1844
106. **Hoya diversifolia** ssp. **chlorina** Kloppenburg & Cajano
107. **Hoya subquintuplinervis** Miquel 1869
108. **Hoya monetteae** Green 2004
109. **Hoya samoensis** subsp. **savai'iensis** Kloppenburg 2017
110. **Hoya cumingiana** subsp. **flosviridia** Kloppenburg, Guevarra & Carandang
111. **Hoya kerrii** Craib 1911 (Thailand white)
112. **Hoya kerrii** Craib 1911 (Marin Cactus)
113. **Hoya bandongii** Kloppenburg & Ferreras 2011
114. **Mt. Matavai, Samoa Green (West)**
115. **Hoya sp. Sulawesi med. Flower**
116. **Hoya tannaensis** T. Green & D. Kloppenburg Type clone 2011
117. **Hoya gretherii** Kloppenburg 2017
118. **Hoya diversifolia** Blume 1826
119. **Hoya sp. Samoa double**
120. **Hoya sp. W 8798**
121. **Hoya matavauensis** Kloppenburg 2011
122. **Hoya smithii** Kloppenburg 2010

119. **Hoya whistleri subsp. faleuluensis** Kloppenburg 2017
120. **Hoya gretheri** Kloppenburg 2017
121. **Hoya sp.** Matoata Cream 2003
122. **Hoya sp.** flowered by Astrid Boström via Torill Nyuus, Sweden
123. **Hoya longifolia** Wallich ex Wight 1834
124. **Hoya golamcoiana** Kloppenburg 1991
125. **Hoya sp.** CAHUP 18680 as *H. cumingiana* Decaisne
126. **Hoya sp.** Ramos & Edano (UC) 49328
127. **Hoya cominsii** Hemsley 1890
128. **Hoya kerrii** Craib 1911 (hairy)
129. **Hoya betchei** (Schltr.) Whistler 1978
130. **Hoya savaiiensis** Kloppenburg & Whistler 2009
131. **Hoya sp. PNH 7889**
132. **Hoya hainanensis** Merrill 1929
133. **Hoya pauciflora** Wight 1848
134. **Hoya diversifolia** subspecies **elnidicus** Kloppenburg 1991
135. **Hoya marginata** Schlechter 1905
136. **Hoya telosmoides** Omlar 1996
137. **Hoya uncinata** Teijsmann & Binnendijk 1863
138. **Hoya vitellinioides** Bakhuizen Brink f. 1950
139. **Hoya fitoensis** Kloppenburg 2015
140. **Hoya sp.** W 1106 (filiformis)
141. **Hoya lamingtoniae** Bailey 1898
142. **Hoya sp.** UC 295, F. H. Bolster
143. **Hoya hamiltoniorum** Lamb et al. 2014
144. **Hoya gigantangensis** Kloppenburg 1992
145. **Hoya uafatoensis** Kloppenburg 2017
146. **Hoya isabelaensis** Kloppenburg, Siar & Ferreras 2011
147. **Hoya odorata** Schlechter CAHUP 19258
148. **Hoya landgrantensis** Kloppenburg 2009
149. **Hoya coronaplana** Kloppenburg & Mendoza
150. **Hoya cumingiana subsp. kamangongensis** Kloppenburg & Mendoza
151. *Hoya cumingiana* ssp. *catanduanesensis* Kloppenburg & Mendoza
152. **Hoya teodymendozae** Kloppenburg & Mendoza
153. **Hoya sulitii** Kloppenburg 2015
154. **W 2705** as *H. filiformis* not
155. **Hoya tamaleaaana** Kloppenburg 2008
156. **Hoya luatekensis** Kloppenburg 2017
157. **Hoya sp. PNH 5733**
158. Poring Hot Springs, Saba, Malaysia TG
159. **Hoya persicina subsp. triapexa** Kloppenburg & Mendoza
160. **Hoya blashernaeszii subsp. diluta** Kloppenburg & Cajano
161. **Hoya corollanerva** Kloppenburg & Mendoza

Hoya dischorensis Schlechter 1913

Flower from TG, clone flowered in Hawaii. I have determined this flower to be *Hoya dischorensis* Schlechter and not *Hoya ischnopus* as original stated.



Pollinarium enlarged
about 165x.

Pollinia

length 0.68 mm
widest 0.22 mm

Retinaculum

length 0.17 mm
shoulder 0.10 mm
waist 0.07 mm
hip 0.09 mm
ext. 0.06 mm

Translator

length 0.11 mm
depth 0.02 mm

Caudicle

bulb diam. 0.06 mm

Translator/caudicle type: ls/o

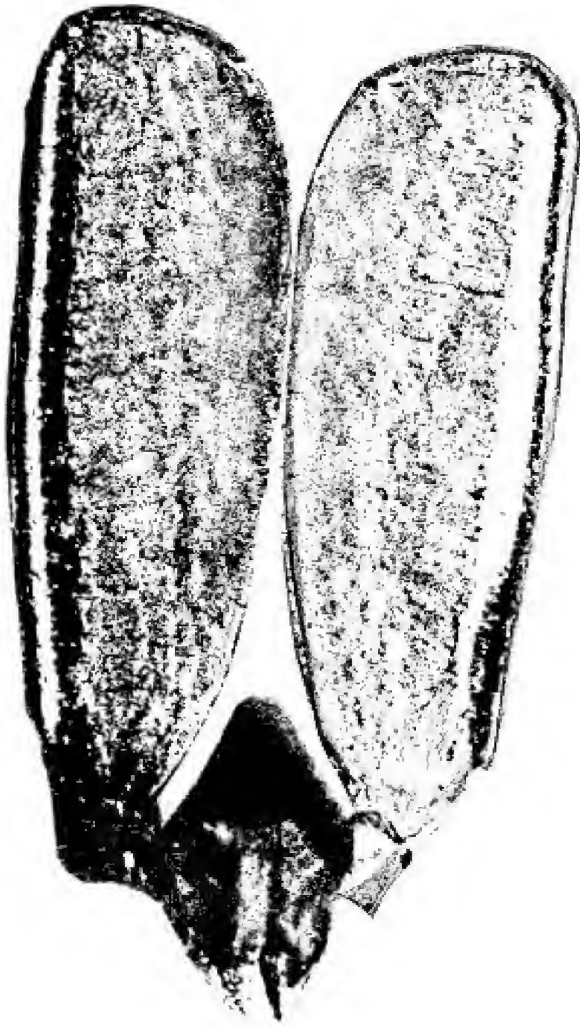
Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Hoya acuta Haworth 1821 ?

Clone from CT, Thailand, foliage looks like *H. finlaysonii* Wight.



Magnified approximately 165x.

Pollinium

length: 0.67 mm
widest: 0.23 mm.

Retinaculum

length: 0.22 mm
shoulder: 0.16 mm
waist: 0.10 mm
hip: 0.12 mm
ext.: 0.05 mm

Translators

length: 0.12 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.04 mm

Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: HE

Hoya sp. (UC) 20732

Hoya vitiensis Turrill

Magnified approximately 165x.



Pollinium

length: 0.67 mm
widest: 0.28 mm

Retinaculum

length: 0.25 mm
shoulder: 0.13 mm
waist: ca. 0.07 mm
hip: 0.09 mm
ext.: 0.04 mm

Translators

length: 0.16 mm
depth: 0.03 mm

Caudicle

bulb. diam. ca. 0.10 mm

Translator/caudicle type: ls/o ?

Pollinia inner end type: R

Caudicle bulb: ?

Retinacula character: S

Hoya golamcoiana Kloppenburg 1991
Flower from **Type** clone via Edward Gilding, Pearl City, HI.



Here the pollinarium is enlarged about 165x. Not shown here are very wide hip shelves on the retinaculum, which would be distinctive of this species. The pollinia are relatively short and wide, translators are small and wide, translators are small and wide, and caudicles are also small.

Pollinarium: pollinia very wide at outer apex still wide in center but then narrowing toward a rounded inner apex. Translators relatively short and narrow in side view. Retinaculum with rounded head, not wide at shoulder but with almost shelf like protrusions in the hip area, extensions held tight.

Pollinia

length	0.67 mm
widest	0.26 mm

pellucid edge and wide vacuole.

Retinaculum

length	0.20 mm
shoulders	0.15 mm
waist	0.06 mm
hip	ca. 0.10 mm
extensions	0.5 mm long

Translators

length	0.11 mm
wide	a little over 0.1 mm

thick and possible a little wider.

Caudicle

bulb not distinct ca. 0.06 mm

Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Retinacula character: R

Hoya chlorantha Rechinger 1908

From herbarium sheet #10477 collected on Upolu by Art Whistler.



Pollinarium enlarged a little less than 165x. It is difficult here to get the exact measurements of the structure as indicated below.

Pollinia

length	0.67 mm
widest	0.23 mm

Retinaculum

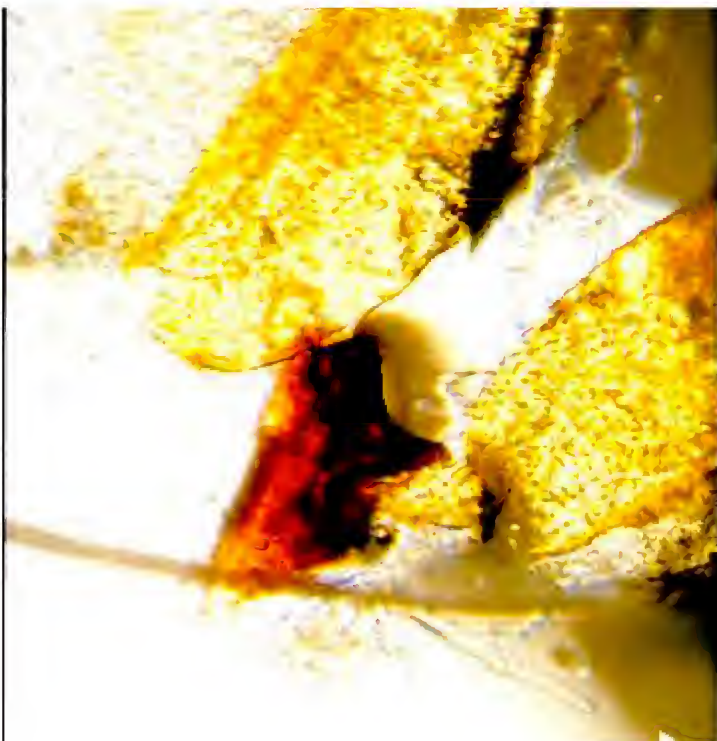
length	0.17 mm
shoulders	0.20 mm
waist	0.08 mm
hip	0.12 mm

Translator

length	0.14 mm
--------	---------

Caudicle

bulb diam.	0.06 mm
------------	---------



Note the differences in the retinaculum structure all due to focus and focal depth. Here again as with many Samoan species the shoulders curve backwards.

Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Retinacula character: HU

Hoya chlorantha Rechinger 1908
From live material collected in American Samoa



Pollinarium enlarged about 165x. End of pollinia truncate, base rounded, pellucid edge from outer apex to near base.

Pollinium

length	0.66 mm
widest	0.28 mm

Retinaculum

length	0.20 mm
shoulders	0.19 mm
waist	0.07 mm
hip	0.13 mm
extensions	0.03 mm

Translators

length	0.12 mm
depth	0.02 mm

Caudicle

bulb diameter	0.10 mm
---------------	---------

Caudicle bulb clear, flattened into a saucer by the end of the pollinium. On the right arm it is small, some may have been pulled away with the missing pollinium.

Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: HU

W 3111 as *Hoya betchei*, determined to be *Hoya chlorantha*



Retinaculum and attached translator arm on left side enlarged about 165x. Measurements below.



Pollinarium enlarged about 165x. End of pollinia truncate, base rounded, pellucid edge from outer apex to near base.

Pollinium

length	0.66 mm
widest	0.28 mm

Retinaculum

length	0.20 mm
shoulders	0.19 mm
waist	0.07 mm
hip	0.13 mm
extensions	0.03 mm

Translators

length	0.12 mm
depth	0.02 mm

Caudicle bulb

diameter	0.10 mm
----------	---------

Caudicle bulb clear, flattened into a saucer by the end of the pollinium. On the right arm it is small, some may have been pulled away with the missing pollinium.

Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: HU

Description of the above herbarium sheet W 3111:

Hoya betchei (Schltr.) Whistler. 13 Aug. 1975 Tutuila, Samoa.

Hoya fetuana Subsp. tutuilensis Kloppenburg 2017

sp. W 3110

Labeled *H. betchei* var. *tutuilensis*. Collected by Dr. Whistler 13 Aug. 1975. Tutuila. Samoa

Flowers maroon, elevation 250 m.

Pollinarium enlarged about 165x. Object distorted with one pollinium missing.



Pollinium

length	0.65 mm
Widest	0.23 mm

Retinaculum

length	0.21 mm
shoulder	0.18 mm
waist	0.08 mm
hip	0.12 mm
extensions	0.07 mm

Translator

length	0.14 mm.
depth	0.03 mm.

Caudicle

bulb diameter	0.05 mm.
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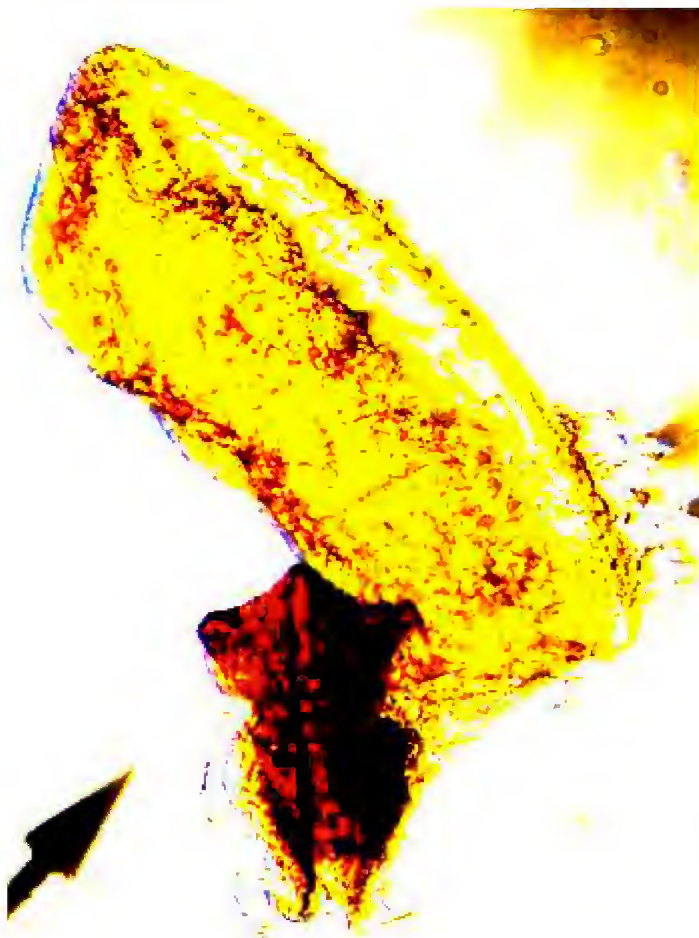
Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: HU

Hoya savaiiensis subsp. falealupoensis Kloppenburg 2015



Pollinarium enlarged about 165 x.

Pollinium

length	0.65 mm
widest	0.25 mm

Retinaculum

length	0.24 mm
shoulders	0.18 mm
waist	0.10 mm
hip	0.15 mm
extensions	0.05 mm

Translator

length	0.15 mm
depth	0.02+ mm

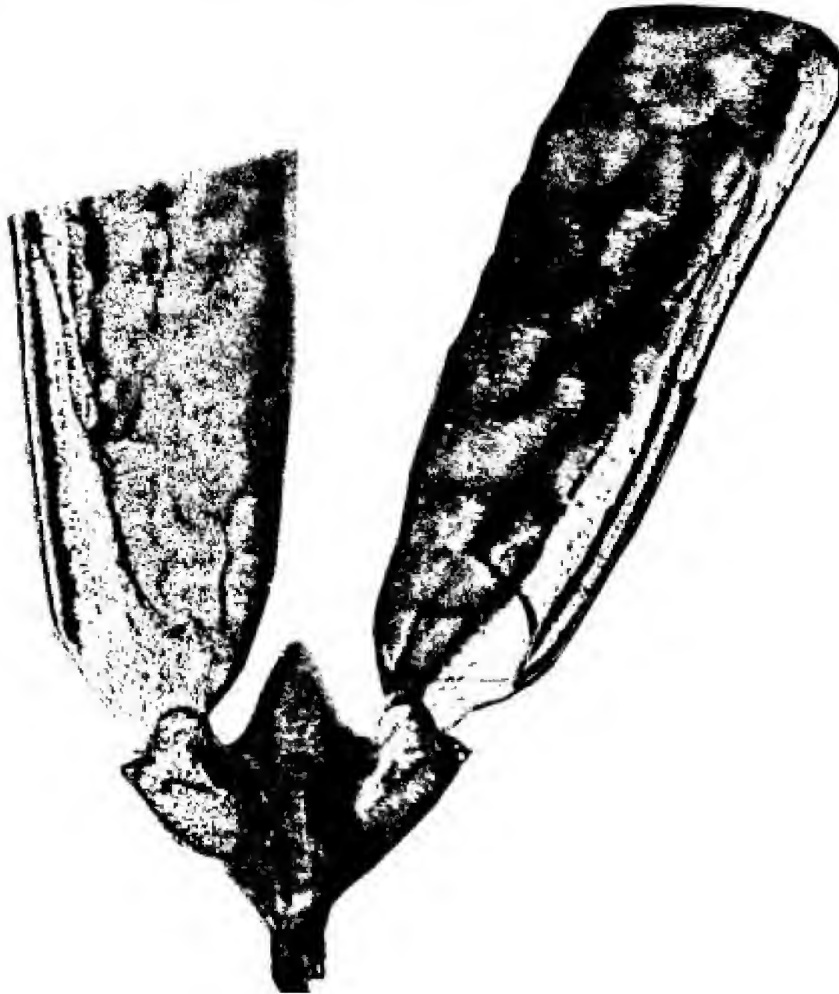
Translator/caudicle type: ls/o

Pollinia inner end type: S
(truncate)

Retinacula type: S (shield) but
nearly Hands up HU)

Hoya acuta Haworth 1821

Flower from clone *H. acuta* var. *greenii*. Flowered in Fresno CA.



Magnified
approximately 165x.

Pollinium

length: 0.65 mm
widest: 0.21 mm

Retinaculum

length: 0.25 mm
shoulder: 0.15 mm
waist: 0.09 mm
hip: 0.14 mm
ext.: 0.05 mm

Translators

length: 0.12 mm
depth: 0.050mm

Caudicle

bulb diam. 0.13 mm

Translator/caudicle
type: ls/o

Pollinia inner end type:
T

Caudicle bulb: G

Retinacula character: HE/HU

Hoya fetuana Kloppenburg 2003

Type material W 2865 (UHAW)



Pollinarium enlarged about 165x.

The retinaculum is skewed a little so there is a normal flat on view below. In this photo the dome shaped caudicle bulb is plainly visible at the base end of the pollinium, supported by the translator arm. In this view it is evident that the shoulders of the retinaculum curve backward (Right side). The pollinium is a little distorted on the lower right side.

Pollinium

length	0.65 mm
widest	0.23 mm

Retinaculum

length	0.25 mm
shoulders	0.18 mm
hip	0.08 mm
waist	0.14 mm
extensions	0.08 mm

Translators

length	0.15 mm
depth	0.03 mm

Caudicle

bulb diam.	0.08 mm
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Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: S

Retinacula and translators; caudicles.

Hoya seanwhistleriana Kloppenburg 2015

Type clone



Pollinarium enlarged about 82x.

Pollinia

length	0.65 mm
widest	0.24 mm

Retinaculum

length	0.23 mm to crotch
shoulder	0.19 mm
waist	0.13 mm
hip	0.18 mm
extension	0.13 mm

Translator

length	0.26 mm
depth	0.02 mm

Caudicle

bulb diam.	0.06 mm
------------	---------



More detailed photo of the lower pollinia area and the small caudicles and short translator arms along with the retinaculum, enlarged as above. There is a wide vacuole on the inner end of the pollinia. a small clear bulbous caudicle supported by narrow up curved short translator arms.

Translator/caudicle type: ls/o

Pollinia inner end type: R (round)

Caudicle bulb: C

Retinacula character: S

W 8717 as *Hoya vitiensis* cf. *Hoya fetuana*



Pollinarium enlarged about 165x.

Pollinium

length	0.64 mm
widest	0.23 mm

Retinaculum

length	0.22 mm
shoulders	0.15 mm
waist	0.06 mm
hip	0.12 mm
extensions	0.05 mm

Translator

length	0.10 mm
depth	0.01 mm

Caudicle bulb

diameter	0.05 mm
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Translator/caudicle type: ls/o

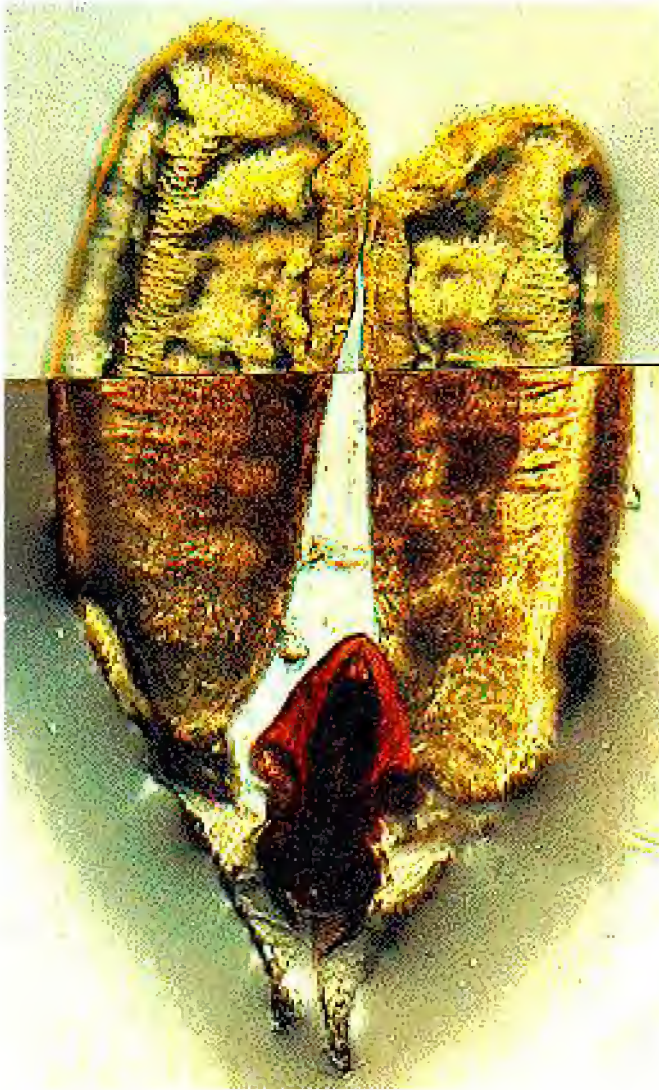
Pollinia inner end type: R (round)

Caudicle bulb: G

Retinacula character: HU

Hoya shephardii Short ex Hooker 1861

Flowered at Fresno, CA.



Pollinarium made up of
Two composite pictures (wouldn't fit in one frame) at 165 magnifications. The translators are relatively long, the retinaculum here is pretty well defined with a long head portion, fairly broad and long with well pollinia developed vacuoles and pellucid edge.

Pollinium

length: 0.64 mm
widest: 0.23 mm

Retinaculum

length: 0.24 mm
shoulder: 0.10 mm
waist: 0.08 mm
hip: 0.11 mm
ext.: 0.04 mm

Translators

length: 0.12 mm
depth: 0.02 mm

Caudicle

bulb diam: 0.03 mm

Translator/caudicle type: ls/o

Retinacula character: S ?

Pollinia inner end type: RT

Caudicle bulb: ?



Another photo of the pollinarium at a lower power, here enlarged about 65x. Note the apparent differences in the retinacula here and above, a difference only of focal length. Here the translators are more readily visible as is the well-developed caudicle.

Hoya cumingiana subsp. rezalensis Kloppenburg, Guevarra &
Carandang

(unpublished) 2012-7-075

Pollinarium below on the left enlarged 160x, on the right 110x.



Pollinium

length	0.64 mm
widest	0.20 mm

Retinaculum

length	0.17 mm
shoulder	0.15 mm
waist	0.07 mm
hip	0.10 mm
ext.	0.04 mm

Translator

length	0.11 mm
widest	0.04 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Hoya sp. Matafoao Ridge Am. Samoa, Yellow

Collected October 2003 2/3 way up the hog-back ridge to the West, where the trail turns South to the Peak. A butter clear yellow flower cluster dangling from a vine from there, leaves fairly large, pinnately nerved.



Pollinarium enlarged about 65x. The species has a well defined retinacula and in the pollinium the vacuole (or fluid space along the pellucid edge is wide.

Pollinia

length	0.64 mm
widest	0.23 mm

Retinaculum

length	0.17 mm
shoulder	0.13 mm
hip	0.07 mm
waist	0.11 mm
ext.	0.05 mm

Translators

length	0.10 mm
depth	0.04 mm

Caudicle

bulb diam.	0.07 mm
------------	---------

Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Hoya cf. amoena Ted Green 2014



Pollinarium here enlarged
ca. 120x.

Pollinium

length	0.64 mm
widest	0.23 mm

Retinaculum

length	0.15 mm
shoulder	0.14 mm
waist	0.08 mm
hip	0.10 mm
ext	0.10 mm

Translator

length	0.08 mm
widest	0.05 mm

Caudicle

bulb diam.,	0.05 mm
-------------	---------

Translator/caudicle type:
ls/o

Pollinia apex type: R

Caudicle: clear.

Retinacula Type: S

Hoya finlaysonii Wight 1834

Flowered at Fresno, CA. via Thailand. Labeled as "pale" from South Thailand

Pollinarium enlarged about 165x.



Pollinia

length	0.64 mm
widest	0.21 mm

Retinaculum

length	0.21mm overall.
shoulders	0.12 mm
waist	0.08 mm
hip	0.09 mm
extensions	0.06 mm

Translators

length	0.11 mm
depth	0.01 mm

Caudicle

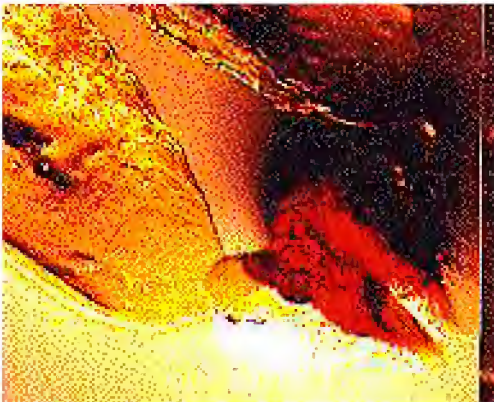
bulb diameter	0.05 mm.
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Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: S



I wanted to show the unusual shoulder area of the retinaculum here enlarged about 165x. The extensions are also long and thick clear caudicles supported by the more opaque translators. The actual retinaculum is relatively short and stubby.

Amongst the species in commerce labeled as this species there appears to be more than one species.

Hoya sp. laurifolia

This flower was sent by Michael Miyashiro from Ted Green originally, photographed in 5/17/90. It is not the species (see that file and the drawing of the species). Here presented as an unknown for now:

Pollinarium enlarged about 84x. This is an unusual pollinarium with the attachments well down on the retinaculum. *Hoya erythrina* Rintz has the most similar pollinarium but also compare with *Hoya meridithii* Green.



Pollinia

length	0.64 mm
widest	0.19 mm

Retinaculum

length	0.17 mm without extensions.
shoulder	0.10 mm
waist	0.09 mm
hip	0.11 mm
extensions	0.04-0.09 mm

Can not determine other measurements.

Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: ?

Retinacula character: S

Hoya cumingiana subsp. biloba Kloppenburg & Mendoza
(unpublished) GM #174



Pollinarium with one pollinia missing, enlarged 180x.

Pollinium

length 0.63 mm
widest 0.17 mm

Retinaculum

length 0.18 mm
shoulder 0.12 mm
waist 0.08 mm
hip 0.09 mm
extensions 0.07 mm

Translator

length 0.14 mm
widest 0.02 m

Caudicle

bulb diam. 0.04 mm

Translator/caudicle type:
ls/o

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: R

Hoya whistlerii Kloppenburg 2002

Ta'u Is., Samoa. Type

Flower via TG, collector Art Whistler.



Magnified approximately 165x.

Pollinium

length: 0.63 mm

widest: 0.20 mm

Retinaculum

length: 0.21 mm

shoulder: 0.14 mm

waist: 0.06 mm

hip: 0.08 mm

ext.: 0.02 mm

Translators

length: 0.12 mm

depth: 0.02 mm

Caudicle

bulb diam.: 0.06 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya recurvula subsp. bokorensis Kloppenburg & Yap 2010
Type clone



Pollinarium
enlarged about 165x
.

Pollinium

length 0.63 mm
widest 0.27 mm

Retinaculum

length 0.15 mm
shoulder 0.14 mm
waist 0.07 mm
hip 0.10 mm
extensions 0.07 mm

Translator

length 0.12 mm
wide 02 mm

Caudicle

bulb diam. .06 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

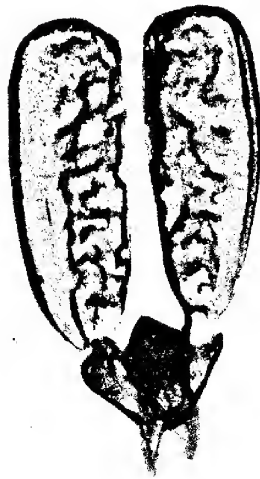
Caudicle bulb: C

Retinacula character: S

Hoya meredithii x crassicaulis

Grown and flowered in Fresno, CA.
from hybrid seedlings via MM.

Magnified approximately 65x



Pollinium

length: 0.63 mm
widest: 0.23 mm

Retinaculum

length: 0.23 mm
shoulder: 0.13 mm
waist: 0.08 mm
hip: 0.11 mm
ext.: 0.08 mm

Translators

length: 0.15 mm
depth: 0.04 mm

Caudicle

bulb. diam.: 0.07 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S

Note retinaculum looks like *Hoya crassicaulis* Kloppenburg not *Hoya meredithii* Green

Hoya sp. Sabah, Malaysia

Flower via Ann Wayman (66).



Magnified approximately 165x.

Pollinium

length: 0.63 mm
widest: 0.23 mm

Retinaculum

length: 0.21 mm
shoulder: 0.15 mm
waist: 0.10 mm
hip: 0.10 mm
ext.: ?

Translators

length: 0.18 mm
depth: 0.04 mm

Caudicle

bulb. diam.: 0.10 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S

Hoya odorata Schlechter 1906

Flower from Loher 13176 (UC) 1913



Magnified approximately
165x.

Pollinium

length: 0.62 mm
widest: 0.21 mm

Retinaculum

length: ca. 0.29 mm

Translator/caudicle **type:**
ls/o

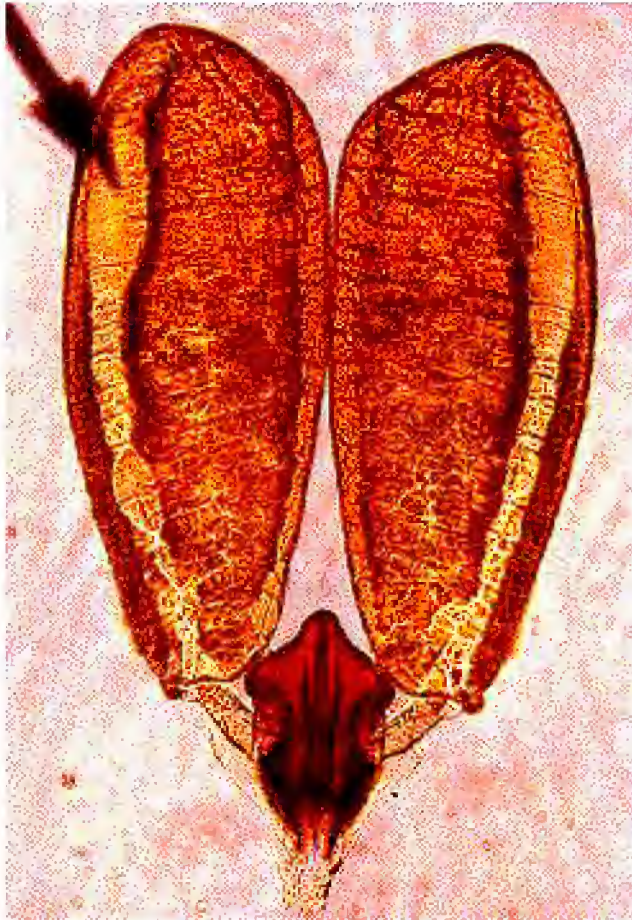
Pollinia apex type: R

Caudicle bulb: ?

Note: the other measurements are not determinable. Here the retinaculum is lying sideways so most details are not showing, nor measurable.

Hoya sp. PNG #4

From flowers collected at Edward Gilding's, Pearl City, Hawaii 9/8/00.



Pollinarium enlarged about 165x. The arrow here (upper left) is 0.1 mm. long. The pollinia here are broad and short, outer ends being broader than the inner end. The vacuole here is wider above than below, usually it is the reverse of this. The retinaculum is short and broad and well constituted, caudicles appear to spread over the translators, both are attached at the waist area of the retinaculum, actually they are attached inwardly from here in an internal cavity.

Translator/caudicle type: ls/o

Pollinia apex type: RT

Caudicle bulb: C

Retinacula character: S

Pollinarium:

Pollinia

length	0.62 mm
widest	0.22 mm near outer apex, vacuoles widest along outer edge.

Retinaculum

length	0.18 mm to end., head narrowly rounded.
shoulders	0.09 mm wide.
waist	ca. 0.4 mm wide.
hips	0.0-7 mm wide. Structure short and broad,
extensions.	short

Translators

length	0.08 mm
depth	ca. 0.20 mm., opaque.

Caudicles

clear,	
bulb diameter	0.07 mm

Hoya obovata Decaisne 1844

Flowered in Fresno, CA. USA.



Pollinarium enlarged about 64x. Top view.

Pollinarium:

Pollinium

length	0.62 mm
widest	0.19 mm

Pellucid edge extending nearly to base attachment area. Inner apex tapering inward, rounded, narrower at inner apex also rounded.

Retinaculum

length to crotch	0.22 mm
shoulders	0.16 mm wide.
waist	0.11 mm wide.
hips	0.12 mm wide.

Translator

	Held close to the retinaculum
length	0.10 mm
rounded.	appearing thin and somewhat

Caudicle

	Tip bulbous
bulb diam.	0.05 mm clear.

Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: HU

Hoya diversifolia ssp. chlorina Kloppenburg & Cajano
sp. AC #006 (unpublished)



Pollinarium enlarged 140x.

Pollinium

length 0.7 0.61 mm
widest 0.3 0.25 mm

Retinaculum

length 0.3 0.17 mm
shoulder 0.18 mm
waist 0.10 mm
hip 0.12 mm
ext. 0.05 mm

Translator

length 0.10 mm
widest 0.02 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
ls/o

Pollinia end type: T

Caudicle bulb: C

Retinacula character: S

Hoya subquintuplinervis Miquel 1869



Pollinium

length	0.61 mm
widest	0.22 mm

Caudicle bulb diam. 0.05 mm

Retinaculum

length	0.14 mm
shoulders	0.14 mm
waist	0.10 mm
hips	0.12 mm
extensions	0.05 mm

Translator/caudicle type: ls/o

Pollinia inner end Type: R

Translators

length	0.11 mm
width	0.03 mm

Caudicle bulb: ?

Retinacula character: R ?

Hoya monetteae Green 2004

Tumarbong Falls, Palawan, Philippines March 2000. The following pictures are from Edward Gilding, cluster of 22 flowers, pure white.



Pollinarium enlarged
about 165x.

Pollinia

length	0.60 mm.
widest	0.20 mm.

Retinaculum

length	0.14 mm.
shoulders	0.14 mm.
waist	0.07 mm.
hip	0.10 mm.
extensions	0.03 mm.

Translators

length	0.07 mm.
depth	0.03 mm.

Caudicle

bulb diam.	0.07 m.
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Translator/caudicle type: ls/o

Pollinia end type: T

Caudicle bulb: ?

Retinacula character: HU

Hoya samoensis subsp. savai'iensis Kloppenburg 2017
W 1237 as *Hoya samoensis* Seemann. 29 Nov. 1973. Savai'i, Samoa. Vine with milky juice and greenish white flowers hanging in trees in the forest at Letolo plantation at Palauli. Elevation 200m.



Pollinarium enlarged about 165x. Long pollinia and a very small retinaculum.

Pollinia

length	0.60 mm
widest	0.18 mm

Retinaculum

length	0.10 mm
shoulder	0.07 mm
waist	0.04 mm
hips	0.05mm
extensions	0.04 mm

Translators

length	0.08 mm
depth	0.03 mm

Caudicle bulb

diameter	0.06 mm
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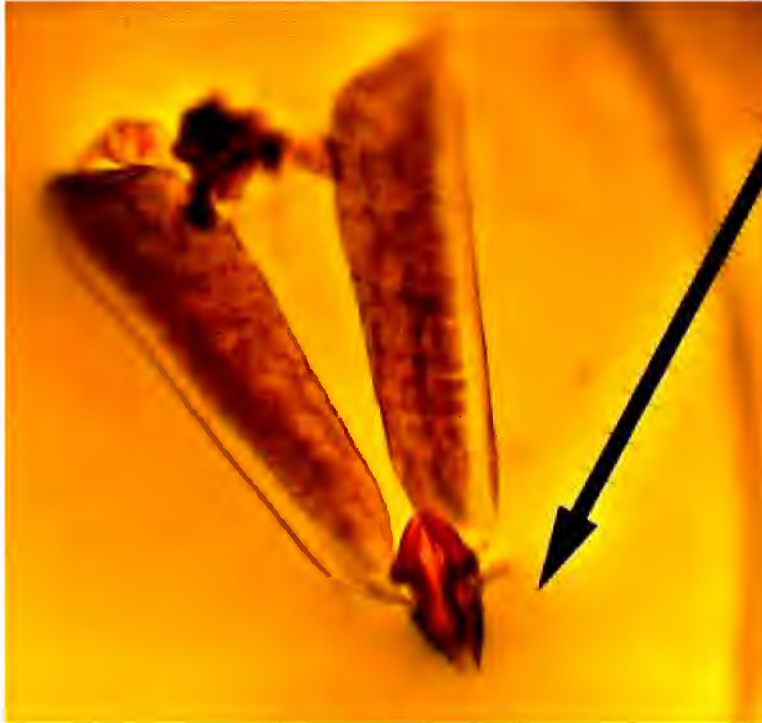
Translator/caudicle type: ls/o

Pollinia end type: R

Caudicle bulb: C

Retinacula character: S ?

Hoya cumingiana subsp. flosviridia Kloppenburg, Guevarra &
Carandang
(unpublished) BG #2012-7-074



Pollinarium enlarged 110x.

Pollinium

length 0.60 mm
widest 0.18 mm

Retinaculum

length 0.15 mm
shoulder 0.15 mm
waist 0.06 mm
hip 0.09 mm
ext. 0.04 mm

Translator

length 0.05 mm
widest 0.02 mm

Caudicle

bulb diam. 0.02mm



Translator/caudicle type: ls/o

Pollinia inner end type: F

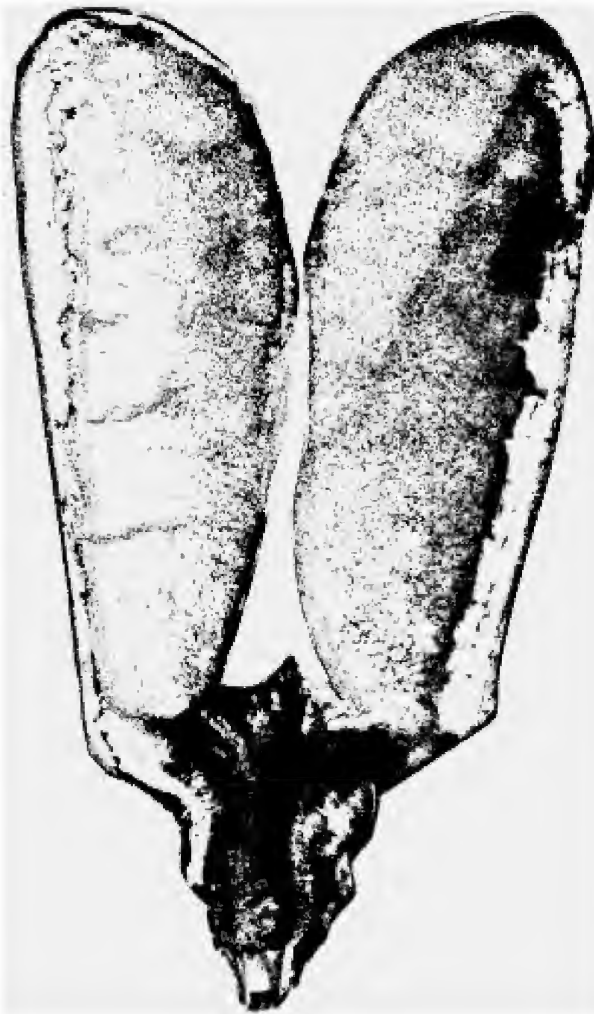
Retinacula character: S

Enlarged as above for additional structural comparisons.

Hoya kerrii Craib 1911

Flower from clone of "Thailand White"
source Sakdi Sir Nsry. Bangkok, Thailand.

Magnified approximately 165x.



Pollinium

length: 0.59 mm
widest: 0.24 mm

Retinaculum

length: 0.24 mm
shoulder: 0.17 mm
waist: 0.06 mm
hip: 0.08 mm
ext.: 0.04 mm

Translators

length: ca. 0.16 mm
depth: 0.04 mm

Caudicle

bulb diam: ?

Translator/caudicle type: ls/o

Pollinia inner end type: RT

Caudicle bulb: ?

Pollinia	<u>Thailand White</u>	<u>Marin Cactus patch</u>	<u>"Hairy"</u>
length	0.59 mm	0.58 mm	0.57 mm
widest	0.24 mm	0.27 mm	0.27 mm
Retinaculum			
length	0.26 mm	0.34 mm	0.37 mm
shoulder	0.17 mm	0.22 mm	0.19 mm
waist	0.08 mm	0.06 mm	0.08 mm
hip	0.11 mm	0.10 mm	0.17 mm
extensions	0.03 mm	0.01 mm	0.06 mm
Translators			
length	0.17 mm	0.20 mm	0.13 mm
depth	0.04 mm	0.03 mm	0.04 mm
Caudicles			
bulb diam.	0.07 mm	0.05 mm	0.08 mm

Hoya kerrii Craib 1911
Flower from clone via Marin Cactus Patch.



Magnified approximately 165x.

Pollinium

length: 0.58 mm
widest: 0.24 mm

Retinaculum

length: 0.20 mm
shoulder: 0.16 mm
waist: 0.06 mm
hip: 0.10 mm
ext.: 0.04 mm

Translators

length: 0.16 mm
depth: 0.03 mm

Caudicle

bulb diam.: 0.07 mm

Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Retinacula character: HU

Hoya bandongii Kloppenburg & Ferreras 2011

Published in Fraterna 24 #4:9-13, 2011 **Type** clone



Pollinarium enlarged ca. 140x.

Pollinium

length	0.57 mm
widest	0.22 mm

Retinacula character: HE

Retinaculum

length	0.31 mm
shoulder	0.24 mm
waist	0.20 mm
hip	0.24 mm
ext.	0.12 mm

Translator

length	0.13 mm
depth	0.04 mm

Caudicle

bulb diam.	0.11 mm
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Translator type: ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Mt. Matavai, Samoa Green (West)

A green flowered species 20 flowers on short curved peduncle with a triplinerved nerved foliage.



Two above photos of the Pollinarium enlarged about 165x.

Pollinium

length	0.57 mm
widest	0.21 mm

Retinaculum

length	0.20 mm
shoulders	0.12 mm
waist	0.07 mm
hips	0.09 mm
extensions	0.03 mm

Translators

length	0.13 mm
depth	0.05 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: ls/o

Pollinia apex type: R

Retinacula character: HE

Hoya sp. Sulawesi med. flower
Collected 1994.



Magnified approximately 165x.

Pollinium

length: 0.57 mm
widest: 0.23 mm

Retinaculum

length: 0.20 mm
shoulder: 0.13 mm
waist: 0.08 mm
hip: 0.11 mm
ext.: 0.13 mm

Translators

length: 0.06 mm
depth:

Caudicle

bulb. diam.:

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S ?

Hoya tannaensis T. Green & D. Kloppenburg Type clone 2011



Pollinarium enlarged about 165x

Pollinium

length	0.57 mm
widest	0.25 mm

Retinaculum

length	0.17 mm
shoulder	0.17 mm
waist	0.10 mm
hip	0.15 mm
ext.	0.09 mm

Translator

length	0.12 mm
depth	0.03 mm

Caudicle

bulb diam.	0.06 mm
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Ratio:	pol./width	2.3
	Pol./ret.	2.2

Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: R

Hoya gretherii Kloppenburg 2017
3949 (UC)

Collected by D. F. Grether & W. H. Wagner, Los Negros, Pitilu Lagoon, Philippines 8
Nov. 194



Pollinarium enlarged
about 165x.

Pollinium

length 0.57 mm
Widest 0.25 mm

Retinaculum

length 0.20 mm
shoulder 0.12 mm
waist 0.06 mm
hip 0.09 mm
ext. 0.02 mm

Translators

length 0.10 mm
depth 0.02 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: G

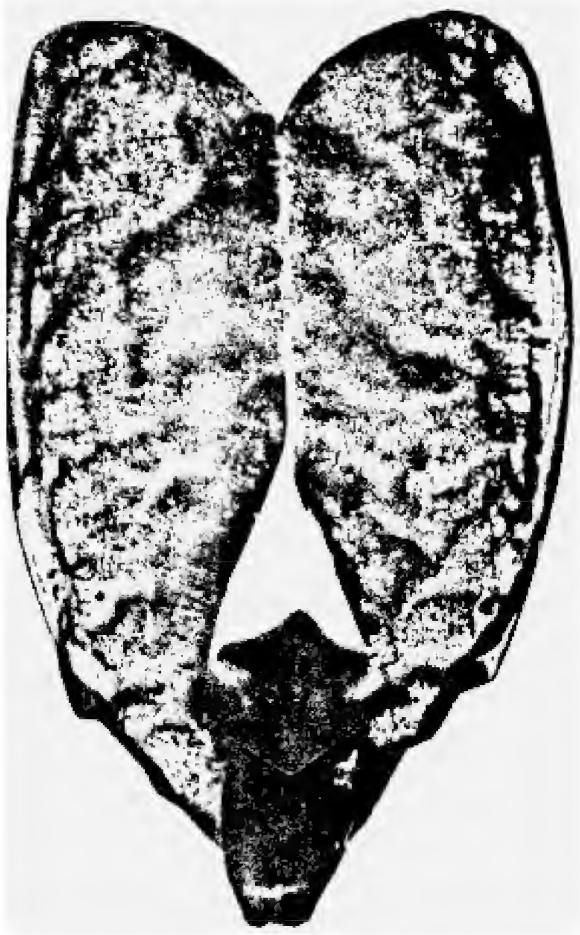
Retinacula character: S

Hoya diversifolia Blume 1826

Flower form clone collected in Central Malaya 1981.

Flowered in Fresno, CA.

Magnified approximately 165x.



Pollinium

length: 0.56 mm
widest: 0.23 mm

Retinaculum

length: 0.23 mm
shoulder: 0.14 mm
waist: 0.14 mm
hip: 0.12 mm
ext.: 0.03 mm

7

Translators

length: 0.13 mm
depth: ?

Caudicle

bulb diam.: 0.08 mm ?

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya sp. Samoa double

Flower from MM, clone collected on road
to Lake Lanatoo, Western Samoa, 1988.



Magnified approximately 165x.

Pollinium

length: 0.56 mm
widest: 0.22 mm

Retinaculum

length: 0.17 mm
shoulder: 0.10 mm
waist: ?
hip: 0.08 mm
ext.: 0.03 mm

Translators

length: 0.12 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.06 mm

Translator/caudicle type: ls/o

Pollinia apex type: F

Caudicle bulb: G

Retinacula character: S ?

Hoya sp. W 8798

Collected by Dr. Whistler on Ofu, Samoa 15 June 1992

Probably *Hoya whistlerii* Kloppenburg



Pollinarium enlarged about 165x. (one pollinia missing).

Pollinium

length	0.56 mm
widest	0.26 mm

Retinaculum

length	0.27 mm
shoulder	0.16 mm
waist	0.05 mm
hip	0.10 mm
extensions	0.03 mm

Translator

length	0.18 mm
depth	0.04 mm

Caudicle bulb (very large, clear)	
diameter	0.18 mm

The clear caudicle can be seen as a light area on the left upper side of the retinaculum and covering the lower portion of the pollinium, it is also squared off slightly on the left at the end of the translator.

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya matavanuensis Kloppenburg 2011

Collected by Dr. Art Whistler 9 May 1994, Savai'i, Samoa, flower white.

Elevation 650m.

9539 cf. diptera



Two views of the pollinaria the top one enlarged about 165x.

Pollinium

length	0.55 mm
widest	0.26 mm

Retinaculum

length	0.26 mm
shoulder	0.15 mm
waist	0.05 mm
hip	0.12 mm
extensions	0.04 mm

Translator

length	0.08 mm
depth	0.03 mm

Caudicle bulb

diameter ca.	0.08 mm
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Caudicle is difficult to discern.



Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: G ?

Retinacula character: S

Hoya smithii Kloppenburg 2010



Pollinarium enlarged about 83x.

Pollinia

length	0.55 mm
widest	0.20 mm

Retinacula

length	0.20 mm to the extensions
shoulder	0.19 mm
waist	0.06 mm
hip	0.10 mm
extensions	0.05 mm

Translator

length	0.07 mm very narrow
depth	0.015 mm

Caudicle bulb diameter 0.06 mm ca.

Translator/caudicle type: ls/o

Pollinia apex type: RT

Caudicle bulb: C ?

Retinacula character: R

Hoya whistleri subsp. faleuluensis Kloppenburg 2017

W 7989

Collected by Dr. Whistler on Ta'u, Samoa 9 Jan. 1991 elev. 350 m.



Pollinarium enlarged about 165x. Retinaculum here skewed to one side.

Pollinium

length	0.55 mm
widest	0.21 mm

8Retinaculum

length	0.15 mm
shoulders	0.12 mm
waist	0.08 mm
hip	0.10 mm
extensions	0.05 mm

Translator

length	0.13 mm
depth	0.02 mm

Caudicle

bulb diam.	0.06 mm
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Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: C

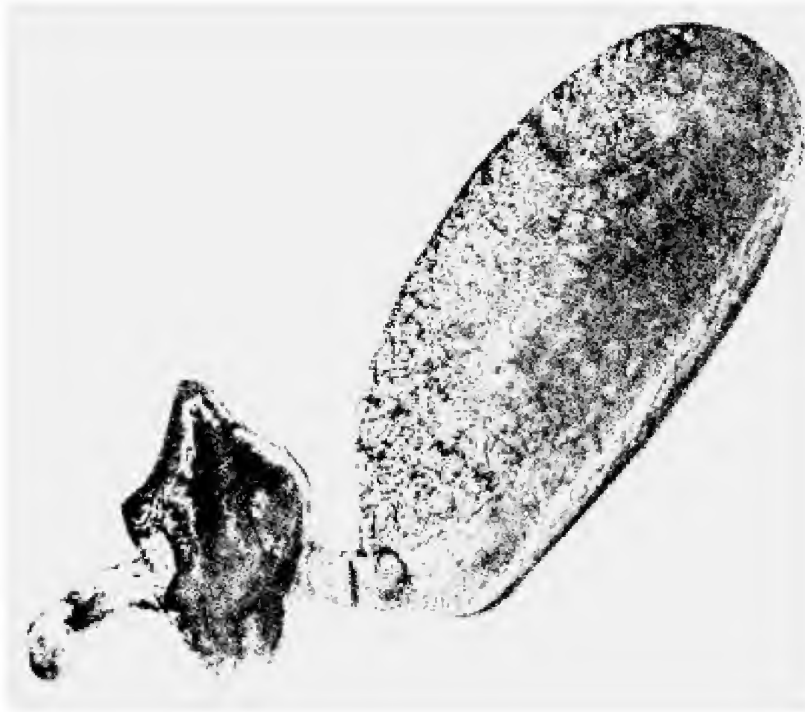
Retinacula character: HU



Retinaculum enlarged about 165x. Note the horns at the shoulder extending backward from this region. The translators are close to the retinaculum sides here and the caudicle is stretched out above.

Hoya gretheri Kloppenburg 2017
Hoya sp. Grether & Wagner Jr. UC 3949
Collected at Pitilu Lagoon, Los Negros, Philippines 1945.

Magnified approximately 165x.



Pollinium

length: 0.55 mm
widest: 0.25 mm

Retinaculum

length 0.25 mm
shoulder 0.16 mm
waist 0.10 mm
hip 0.12 mm
ext. 0.02 mm

Translators

length 0.16 mm
depth 0.03 mm

Caudicle

bulb diam. 0.03 mm

Translator/caudicle type:
ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S ?

Hoya sp. Matoata Cream 2003

SW end of Tutuila, American Samoa 50m.

In bloom early October 2003 vine just above roadside in bloom with 26 large cream colored flowers on long rachis, bracteate.



Pollinarium enlarged about 165x, with the binocular microscope. Note the yellow caudicles.

Pollinia

length	0.55 mm
widest	0.22 mm

Retinaculum

length	0.15 mm
shoulder	0.12 mm
waist	0.08 mm
hip	0.10 mm
extension	0.09 mm

Translators

length	0.14 mm
widest	0.05 mm

Caudicle

bulb diameter	0.07 mm
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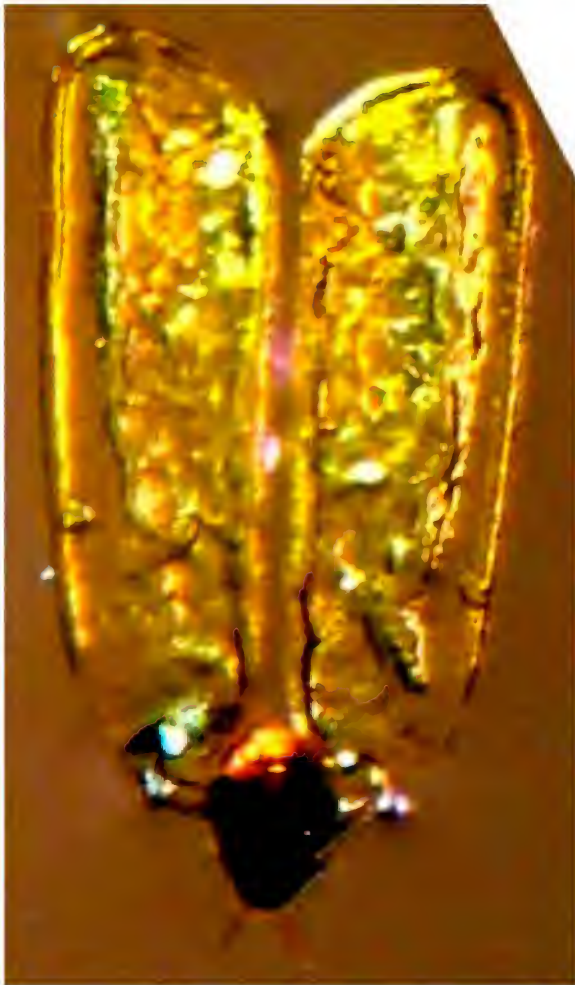
Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya sp. flowered by Astrid Boström via Torill Nyuus, Sweden
Specimen collected in Buluson, Philippines



Pollinarium enlarged about 165x. The pollinia are long and relatively narrow with rounder inner apices. The pellucid edge extends over this edge. The retinaculum is minute with short translators and small caudicles. The extensions are flared and not well developed.

Pollinium

length	0.55 mm
widest	0.19 mm

Retinaculum

length	0.15 mm
shoulders	0.10 mm
waist	0.05 mm
hip	0.07 mm
ext.	0.04 mm

Translators

length	0.09 mm
width	0.02 mm

Caudicle bulb diam. 0.05 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya longifolia Wallich ex Wight 1834

Flowered at Fresno, CA.



Pollinarium enlarged about 165x. I believe each species pollinarium is distinct. There are so many features in this complex structure with which to delineate differences. Here among other characters is the translators attached way up under the head of the retinacula. The pollinia are broad and relatively short with wide vacuoles in from the narrow pellucid edge. both apices of the pollinia are rounded the outer ones more so, tapering inward slightly. The retinaculum has a broad head, narrow double waist and medium broad hip area. The translators appear to be rounded and nearly straight, the caudicles are very small.

Translator/caudicle type: ls/o

Pollinia apex type: R

Retinacula character: S

Pollinia

length	0.55 mm
widest	0.26 mm

Retinaculum

length	0.23 mm
shoulder	0.14 mm
waist	0.07 mm
hip	0.11 mm
extensions	0.02 mm

Translators

length	0.06 mm
depth	0.01 mm

Caudicle

bulb diam.	?
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Hoya golamcoiana Kloppenburg 1991

Flower from **Type** CAHUP 41930

shown here again as it is close to the cumingiana species.



Magnified approximately
165x.

Pollinium

length: 0.55 mm

widest: 0.20 mm

Retinaculum

length: 0.15 mm

shoulder: 0.13 mm

waist: 0.06 mm

hip: 0.09 mm

ext.: 0.07 mm

Translators

length: 0.10 mm

depth: 0.02 mm

Caudicle

bulb diam.: 0.06 mm

Type: G

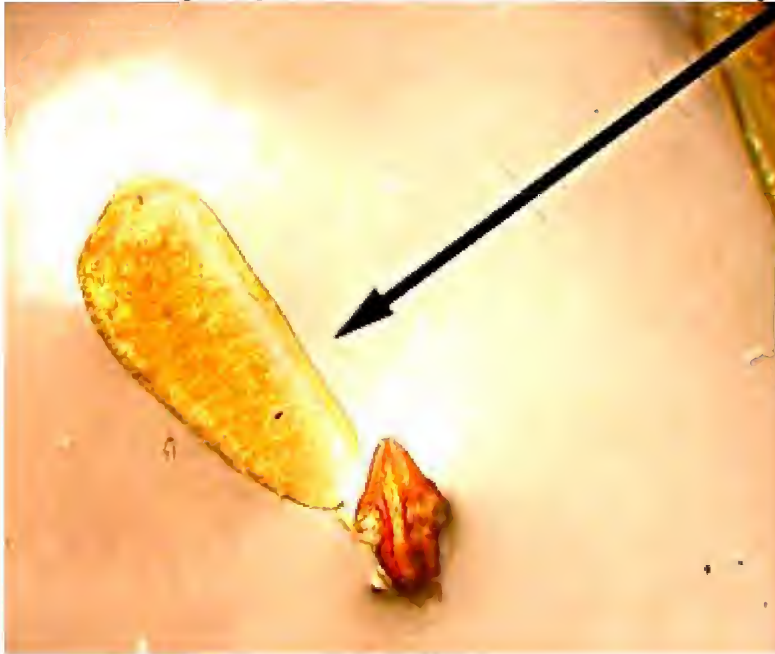
Translator/caudicle type:
ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: LS

Hoya sp. CAHUP 18680 as *H. cumingiana* Decaisne



Pollinarium enlarged about 165x.

Pollinium

length 0.55 mm
widest 0.23 mm

Retinaculum

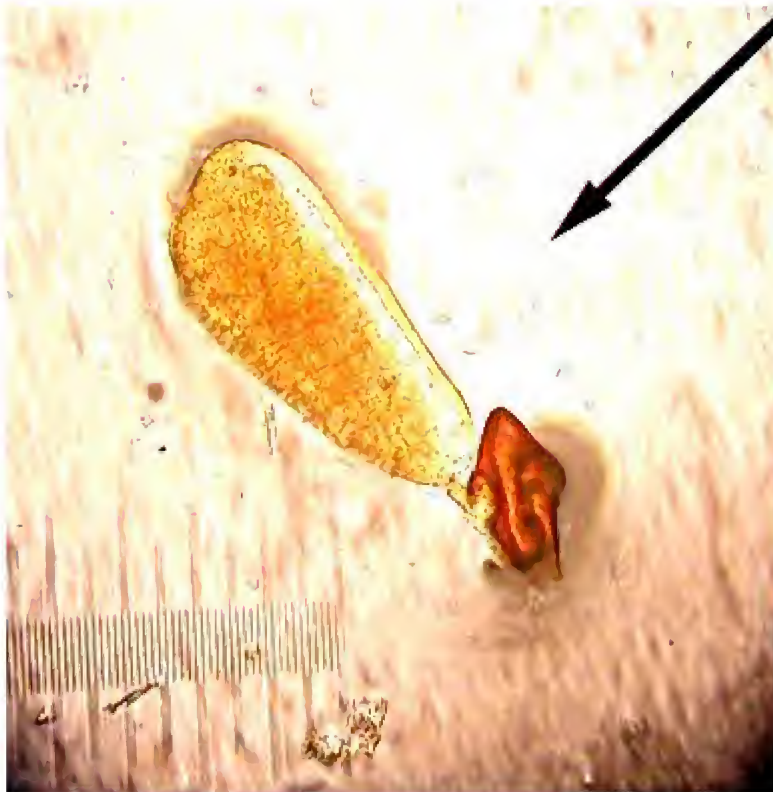
length 0.22 mm
shoulder 0.14 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.03 mm

Translators

length 0.07 mm
depth 0.02 mm

Caudicle

bulb diam. 0.07 mm



A second photo of the pollinarium. As above the pollinium has turned on the axis and the pellucid edge in inward. Outer apex is widely rounded, translators are short and narrow, caudicle bulb not well defined. Here the retinacular measurements were slightly smaller.

Leaves look like *H. densifolia*, the Pollinarium does not fit either species, as it is the pollinia are

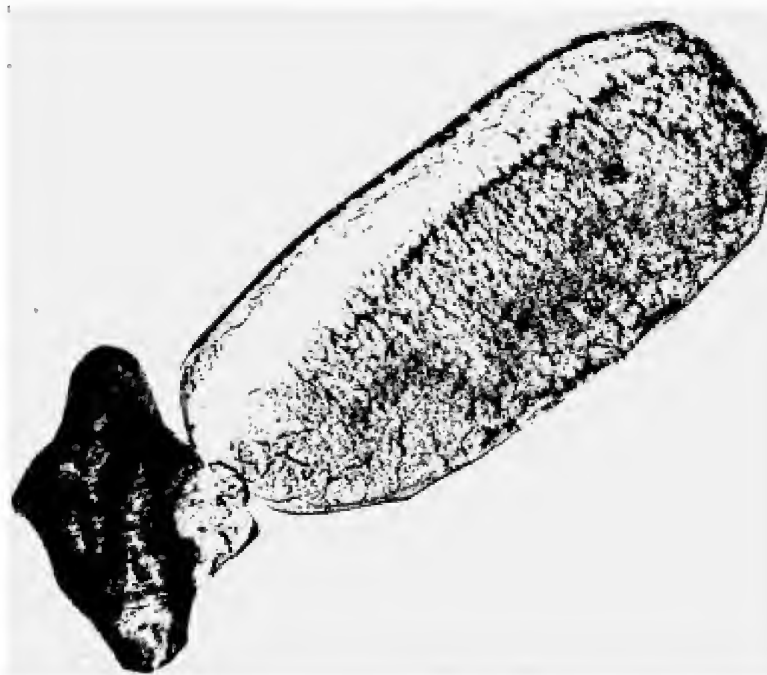
much shorter.

Translator/caudicle type: ls/o

Pollinia apex type: R
Caudicle bulb: C

Retinacula character: S

Hoya sp. Ramos & Edano (UC) 49328
1927 at Mati, Davao, Mindanao.



Magnified approximately 165x.

Note: pollinium twisted inward on its axis

Pollinium

length: 0.55 mm
widest: 0.24 mm

Retinaculum

length: 0.23 mm
shoulder: 0.17 mm
waist: 0.08 mm
hip: 0.12 mm
ext.: 0.04 mm

Translators

length: 0.07 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.05 mm

Translator/caudicle type: ls/o

Retinacula character: S

Pollinia apex type: R

Caudicle bulb: ?

Hoya cominsii Hemsley 1890

Flower from clone IML 457 van Ann Wayman



Pollinarium of DAV 819 enlarged approx. 165x. The Pollinarium of IML 457 is almost identical. At this time I do not see that these are different species. The retinaculum (not showing here) has a definite groove down the top side, the inner apex is fairly narrow and pointed and the shoulders are prominent, at one level of focus reveal the inward pointing end, a sharp waist, rounded hips (all visible here). The translators are short supporting bulbous clear caudicles. Pollinia are long broad with a pellucid sterile edge extending only part way from the inner ape toward the caudicle. The adjacent vacuole is especially wide in this species.

Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: HU

Pollinium

length	0.54 mm
widest	0.19 mm

Retinaculum

length	0.13 mm
shoulder	0.12 mm
waist	0.07 mm
hip	0.08 mm
extensions	0.03 mm

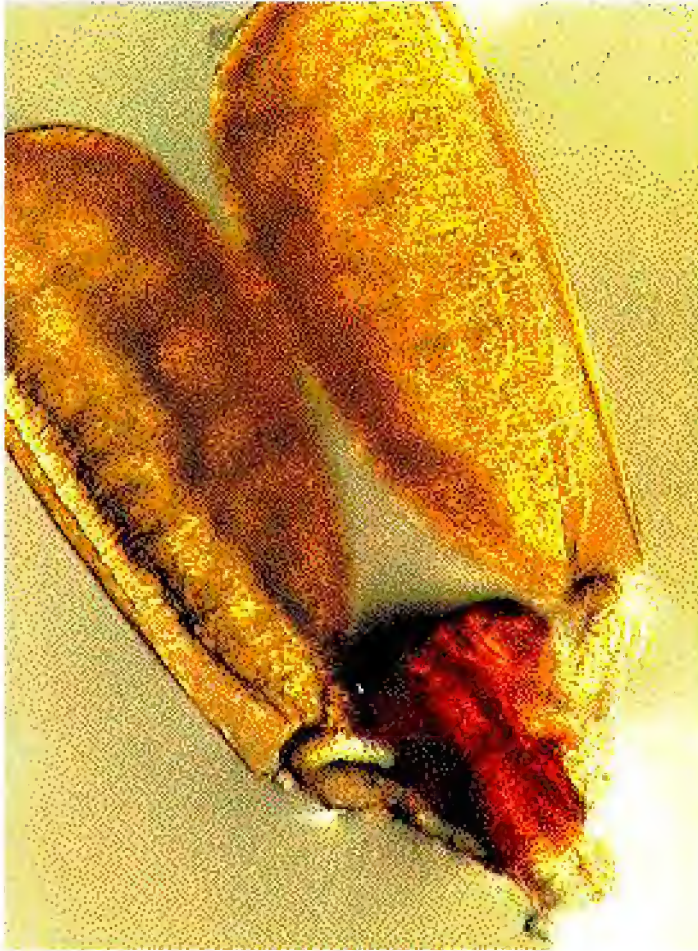
Translators

length	0.10 mm
depth	0.02 mm

Caudicle

bulb diam. 0.14 mm

Hoya kerrii Craib 1911
Flower from clone "hairy kerrii"



Pollinarium enlarged about 165x. The head of the retinaculum is actually apiculate, or with a slight protrusion (not well defined Here) with broad shoulder area and the internal cavities to which the translators and caudicles are attached are plainly visible. The pollinia are broad with rounded apex. The sterile edge is almost straight not curving around the end adjacent to the retinaculum. The caudicle is clear bulbous almost enveloping the translators.

Pollinium

length 0.54 mm
widest 0.23 mm

Retinaculum

length 0.25 mm

shoulder 0.22 mm

waist 0.09 mm

hip 0.14 mm

Translators

length 0.16 mm
depth 0.04 mm

Caudicle

bulb diam. 0.08 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya betchei (Schltr.) Whistler 1978

Collected by Dr. Whistler 7 Jan. 1976, Upolu, Samoa elev. 400m.

W 3243 *Hoya betchei* I believe this is correct.

Pollinarium above enlarged about 148X. to show the retinaculum better then the photo below.



Pollinium

length	0.54 mm
widest	0.20 mm

Retinaculum

length	0.15 mm
shoulders	0.11 mm
waist	0.07 mm
hip	0.09 mm
extensions	0.04 mm

Caudicle

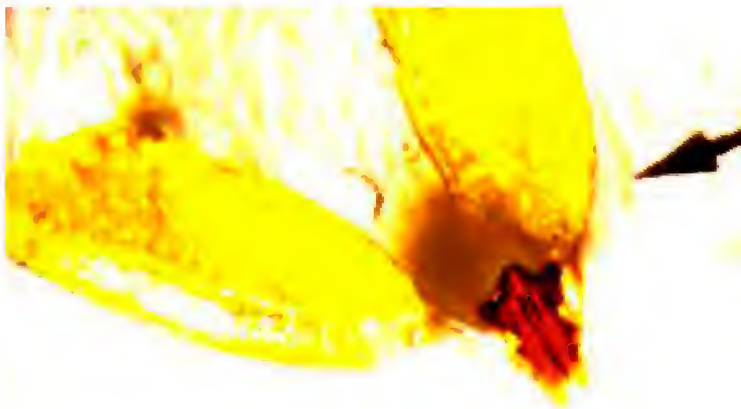
bulb diameter	0.05 mm
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Translator/caudicle type: ls/o

Pollinia apex type: F

Caudicle bulb: C

Retinacula character: S



Hoya savaiiensis Kloppenburg & Whistler **Type** clone 2009
 Collected by Dr. Art Whistler on Savai'i 30 April 1994 flowers white, elev. 50 m.



Pollinia

length	0.54 mm
widest	0.21 mm

Retinaculum

length	0.18 mm
shoulders	0.12 mm
waist	0.06 mm
hip	0.10 mm
extensions	0.03 mm

Translator/caudicle type: ls/o

Pollinia end type: RT

Caudicle bulb: ?

Retinacula character: S



A better view of the retinaculum enlarged as above. Translators are short and wider near the retinaculum only part of the clear caudicle on top is visible here, may have stayed on the pollinium end. Same retinaculum will yield some structural differences due to depth of focus as this is a 3 dimensional object. Note here the shoulders seem to turn up and as they go back at a lower level, they turn down. Pollinia has a clear pellucid edge from top to near the inner end and accompanied by the void area with no pollen structures present. Some pollen grains have germinated.

Hoya sp. PNH 7889

Collected by McClure 24 Oct. 1921 near Taoi Tseng, Hainan



**Retinacula
character: S**

**Pollinia inner end
type: T**

Translator/caudicle:
ls/o ?

Pollinarium enlarged about 165x. and a retinaculum in a little better detail

Pollinium

length	0.53 mm
widest	0.20 mm

Retinaculum

length	0.27 mm
shoulder	0.10 mm
waist	0.05 mm
hip	0.06 mm
ext.	0.03 mm.

Translators

length ca.	0.10 mm
depth	0.03 mm

Caudicle bulb diam. 0.05 mm ca.

Hoya hainanensis Merrill 1929

Pollinarium from **Type**, McClure 9757.



Magnified about 165x.

Pollinium

length:	0.53 mm
widest:	0.21 mm

Retinaculum

length:	0.26 mm
shoulder:	0.14 mm
waist:	0.09 mm
hip:	0.12 mm
ext.:	0.02 mm

Translators

length:	0.11 mm
depth:	0.03 mm

Caudicle

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: HE

bulb diam.: 0.08 mm

Hoya pauciflora Wight 1848
Flower from Jerry Williams, Vista, CA.



Magnified approximately
165x.

Pollinium

length: 0.53 mm
widest: 0.26 mm

Retinaculum

length: 0.21 mm
shoulder: 0.26 mm
waist: 0.10 mm
hip: 0.11 mm
ext.: 0.04 mm

Translators

length: 0.12 mm
depth: 0.04 mm

Caudicle

bulb diam.: 0.05 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S

Hoya diversifolia subspecies **elnidicus** Kloppenburg 1991

Flower from **Type** clone CAHUP 41931, El Nido, Palawan, Philippines.

Magnified approximately 165x.



Pollinium

length: 0.52 mm
widest: 0.20 mm

Retinaculum

length: 0.18 mm
shoulder: 0.12 mm
waist: 0.07 mm
hip: 0.09 mm
ext.: 0.03 mm

Translators

length: ca. 0.10 mm
depth: 0.02 mm

Caudicle

bulb diam.: 0.05 mm

Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: S

Comments: this species has been incorrectly placed into synonym with *H. diversifolia* Blume. Compare to see the pollinaria differences.

Hoya marginata Schlechter 1905

This species I collected at the Teneru Falls with Geoff Dennis. I am not certain the following flower study supplied by Ann Wayman is the same species or clone. Film roll 254, 8/20/00.



View of a pollinarium. The scale (arrow) is a little blurred but I think about correct in my measurements:

Pollinium

length	0.52 mm
widest	0.20 mm

-

Retinaculum

length	0.17 mm
shoulder	0.12 mm
waist	0.04 mm
hip	0.09 mm
ext.	0.07 mm

Translator

length	0.12 mm
widest	0.06 mm

Caudicle

bulb diam.	0.07 mm
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Translator/caudicle type: ls/o

Pollinia apex type: RT

Caudicle bulb: C

Retinacula character: S

Hoya telosmoides Omlar 1996



Two pollinarium, enlargement undetermined., typical of the Genus Hoya. Relatively small, retinaculum somewhat ovate, with short translators.

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

The reticle here is a little fuzzy so precise measurements are not possible. As best as I can manage are listed here

Pollinium

length	0.52 mm
widest	0.22 mm

Retinacula

length	0.23 mm
shoulder	0.14 mm
waist	none
hip	none
ext.	0.02 mm

Translators

length	0.12 mm
widest	0.03 mm

Caudicle

bulb diam.	0.06 mm
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Hoya uncinata Teijsmann & Binnendijk 1863

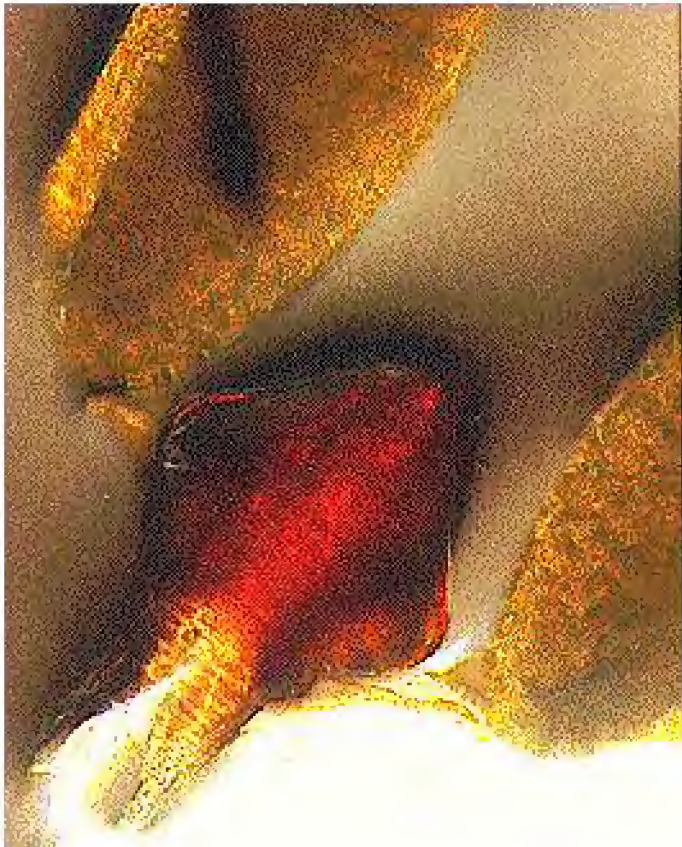
Synonym *Hoya padangensis* Schlechter.



I wanted to show at least photomicrographs here to illustrate the face that even small objects have depth and because they do focusing at varying depths reveal different structural features. One photo will not tell the whole story. Here the object is enlarged about 165x and the focus is to the top of the retinaculum and reveals a point on the head of the retinaculum, with broad rounded areas to the sides. It is well to note that the pollinia are thick and short with a thick and relatively short pellucid edge and well developed pentagonal walled pollen grains. Now look at the next photomicrograph and see the differences a different focal length difference reveals. I usually portray the pollinarium so that it shows the translator attachments and a good



overall view of the retinacula structure as well as the pollinia. In the previous picture the rounded sides are the result of what I term the shoulder of the retinaculum protruding forward from the main body of the structure. Here you see the structure with a rounded head, protruding shoulders and the lighter cavities in the sides where the translators and caudicle inner ends are attached. There is very little narrowing of the waist but the divided outer apex is well developed.



One final photo enlarged about 165x in the hope of showing some detail of the translator which here on thin, cupped on the upper side supporting a thin caudicle to which the pollinium sticks. Here it appears that the translator extends on down the side of the retinaculum whereas the caudicle appears to enter the cavity in the retinaculum side. It might be well to note the horizontal striations on the retinaculum surface. This pollinia is similar to that found in *H. bordenii* Schlechter, *H. mindorensis* Schlechter and *H. solaniflora* Schlechter.

Pollinarium:

Pollinia

length	0.52 mm
widest	0.27 mm

Retinaculum with rounded head broad forward protruding shoulders, and short hips, short waist; with divided (legs) horizontally lined.

length	0.45 mm including divided legs
shoulders	0.28 mm
waist	0.16 mm
legs	0.16 mm long

Translator

length	0.19 mm narrow in thickness.
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Caudicle

bulb diameter	0.05 mm
---------------	---------

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: C ?

Retinacula character: S

Hoya vitellinioides Bakhuizen Brink f. 1950



Pollinarium enlarged about 165x. Here at least 40 years old from the type sheet. The retinacula is almost identical to that of *H. meredithii* Green. The retinacula being long had a tendency to turn on its axis so I could get only 2 to stay oriented correctly. The pollinia are notorious also for turning, leaving the pellucid edge facing the center rather than as in the natural state .



Pollinarium enlarged about 165x.
Here the retinaculum has turned on its axis so not in its natural configuration and also the left pollinium has turned so the pellucid edge is internal. The apical slope of the pollinia conforms to that of *Hoya meredithii* Green but appear to be a little more broad.

Pollinarium:

Pollinia

length	0.52 mm	pellucid edge rather thick
widest	0.19 mm	

Retinaculum

length	0.22 mm	
shoulder ca.	0.04 mm	narrow and long with groove down entire length,

about. wide, edges appear to be rough in places.

Translator,

length	0.14 mm
widest	0.10 mm

Caudicle ca. 0.09 mm in diameter.

Translator/caudicle type: ls/o

Pollinia apex type: F

Caudicle bulb: G

Retinacula character: E

Discussion: I would say this species and *Hoya meredithii* Green are very closely related but there are several major differences. According to the description this species has an almost flat corolla, yellow dry 0.8 cm in diameter. *H. meredithii* has reflexed corolla lobes also yellow but 1.4 cm in diameter. The type description says translators almost twice longer (longer than what, I do not understand). To add to the confusion look at my Passport to IPPS 7020.

Hoya fitoensis Kloppenburg 2015

Labeled *H. diptera* but not that sp. Collected by Dr. Whistler 14 May 1996, Upolu, Samoa. Elevation 1060 m. White or pink flowers. **sp. W 10007**



Pollinarium enlarged about 165x.

Pollinia

length	0.52 mm
depth	0.22 mm

Retinaculum

length	0.15 mm
shoulder	0.10 mm
waist	0.05 mm
hips	0.10 mm
extensions	0.03 mm

Translator

length	0.11 mm
depth	ca 0.02 -0.-05 mm

Caudicle

bulb diameter	0.05 mm
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Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: C ?

Retinacula character: HU

Retinaculum below not as enlarged.



Hoya sp. W 1106

Labeled *H. filiformis*. Collected by Dr. Art Whistler Upolu, Samoa elev. 600m.
Flowers white



Pollinium enlarged about 165x. Pollinia and Retinaculum could not be removed attached. Lower right edge folded in slightly.

Pollinium

length	0.52 mm
widest	0.21 mm

Retinaculum

length	0.18 mm
shoulder	0.09 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.03 mm

Translator

length	0.10 mm
depth	0.04 mm

Caudicle

bulb diameter	ca. 0.05 mm
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Retinaculum laying a little sideways enlarged about 165x. translator close to side on left and skewed down on right side, caudicle enveloping apical end.

Translator/caudicle type: ls/o

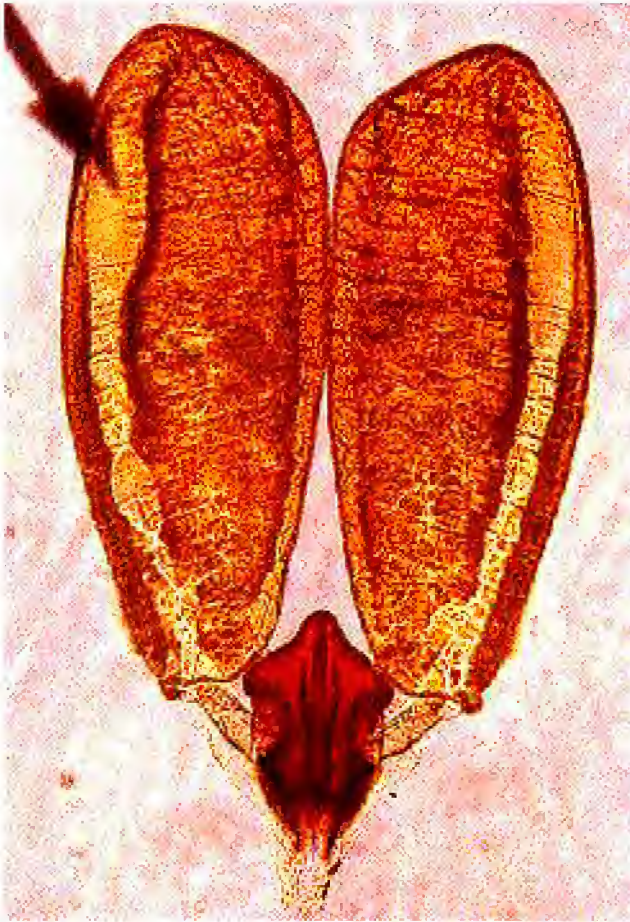
Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S

Hoya lamingtoniae Bailey 1898

Hoya sp. PNG #4



Pollinarium enlarged about 165x. The arrow hear (upper left) is 1mm long. The pollinia here re broad and short, outer ends being broader than the inner end. The vacuole here is wider above than below, usually it is the reverse of this. The retinaculum is short and broad and well constituted, caudicles appear to spread over the translators, both are attached at the waist area of the retinaculum, actually they are attached inwardly from here in an internal cavity.

Pollinarium:

Pollinia	0.52 mm long, 0.22 mm widest near outer apex, vacuoles widest along outer edge.
Translators	0.08 mm long, ca. 0.02 mm wide, opaque.
Caudicles	clear, bulb 0.07 mm in diameter.
Retinaculum	0.18 mm long, head narrowly rounded, shoulders 0.12 mm wide, waist ca. 0.07 mm wide, hips 0.10 mm wide. Structure short and broad, with short extensions.

Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: S

Hoya sp. UC 295, F. H. Bolster
Placer, Lake Mainit, Surigao, Mindanao, Philippines
Climbing on tree, large cluster of flowers. 50-60



Pollinarium with one pollinia missing and the retinaculum twisted.

Pollinium

length	0.51 mm
Widest	0.20 mm

Retinaculum

length	0.21 mm
shoulders	0.11 mm
waist	0.05 mm
hips	0.09 mm
ext.	0.05 mm

From this pollinium the species appears to be *H. merrillii* Schlechter

Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: S ?

Hoya lanceolata Wallich ex Don 1825

Flower via Torill Nyhuus, Sweden.



Top view of the pollinarium enlarged about 65x.

Compare the pollinia here to *Hoya bella* Hooker.

Here the pollinia are much shorter relatively. The retinacula are both long but this one has a narrowing near and lower apex. Both have well-developed translators (long) and caudicles.

Top view of Pollinarium enlarged about 165x. Note how broad and relatively short the pollinia are, how the pellucid sterile edge does not come near the attached apex, also the large vacuole in from this edge. There are small shoulders on the retinaculum and 2 sets of protrusions lower down (these protrusions are also present in *Hoya bella* Hooker) The translators support a large bulbous end of the caudicle, somewhat triangular in outline in flat view.



Pollinia

length	0.51 mm
widest	0.22 mm

Retinaculum

length	0.27 mm
shoulder	0.09 mm
hip	0.05 mm
waist	0.08 mm
extensions	0.02 mm

Translators

length	0.15 mm
depth	0.02 mm
width	0.02 mm

Caudicle (cone shaped end)
bulb diam. 0.08 mm

Translator/caudicle type:
l/cw

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: HE

Hoya hamiltoniorum Lamb et al. 2014



Pollinarium
enlarged ca. 100x.

Pollinarium

length 0.51 mm
widest 0.22 mm

Retinaculum

length 0.42 mm
shoulder 0.36 mm
waist 0.19 mm
hip 0.20 mm
ext 0.13 mm

Translator

length 0.19 mm
wide 0.04 mm

Caudicle

bulb diam. 0.12 mm

Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: finely G

Retinacula character: HE

Hoya gigantangensis Kloppenburg 1992
from the **type** material #36787(PNH)



Pollinarium enlarged about 165x.

Pollinia

length	0.51 mm
widest	0.15 mm

Retinaculum

length	0.19 mm
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Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Hoya uafatoensis Kloppenburg 2017

Hoya sp. W 10339

labeled *H. diptera* but not that species W 10339 Upolu diptera. Collected 3 April 1997
Upolu, Samoa by Dr. Art Whistler 400m elevation. White flowers red at base.



Pollinarium enlarged about 165x.

Pollinium

length	0.51 mm
widest	0.20 mm

Retinaculum

length	0.12 mm
shoulders	0.11 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.04 mm

Translators

length	0.09 mm
depth	0.01 + mm

Caudicle

bulb diameter	0.05 mm
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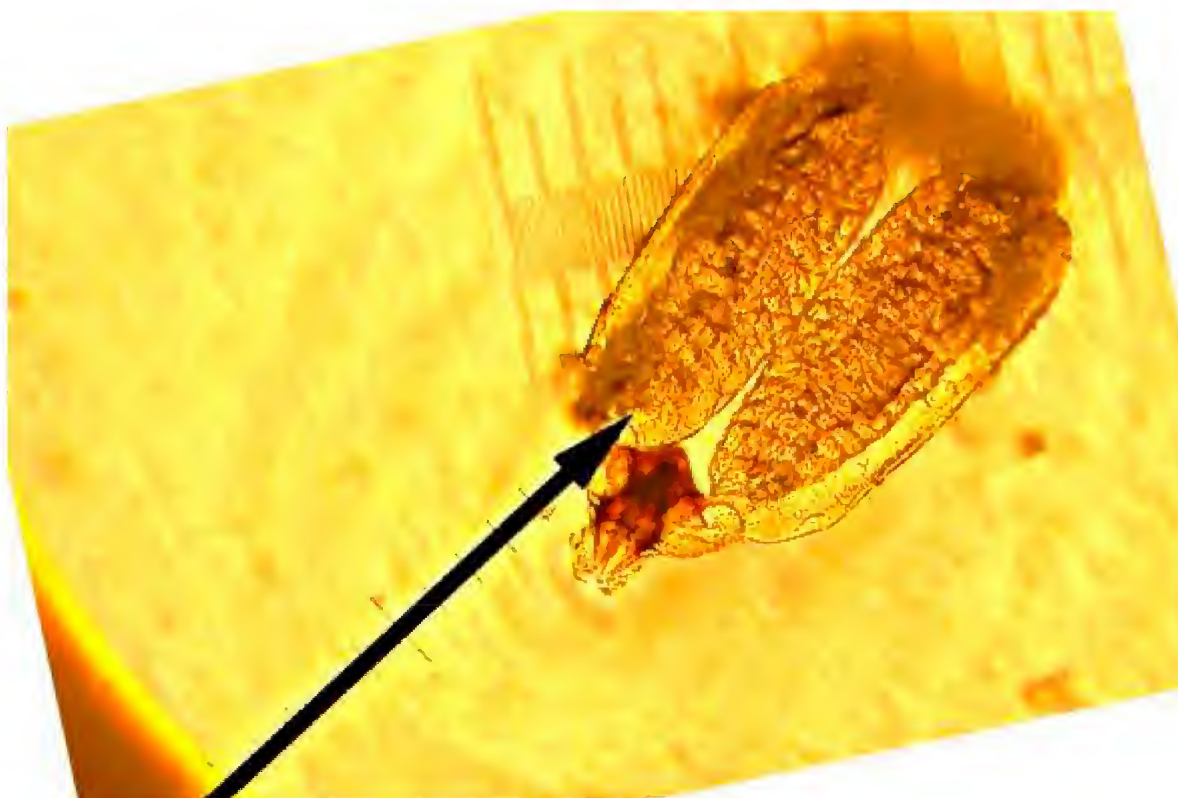
Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: C ?

Retinacula character: HU

Hoya isabelaensis Kloppenburg, Siar & Ferreras 2011



Pollinarium enlarged about 180x.

Pollinium

length	0.51 mm
widest	0.20 mm

Translator

length	0.12 mm
depth	0.02 mm

Retinaculum

length	0.12 mm
shoulder	0.12 mm
waist	0.05 mm
hip	0.09 mm
ext.	0.06 mm

Caudicle

bulb diam.	0.05 mm
------------	---------

Type: G

Ratios:	pol./width	2.6
	pol./ret.	2.8

Pollinia inner end type: T

Retinacula type: S

Hoya odorata Schlechter CAHUP 19258

Collected by B. F. Harriail 20 Oct. 1968, Mt. Miquiling on summit of peak two.
Elevation 1114 meters. Flower white, leaf very small.



Retinaculum enlarged about 165x. This is the same as 18041 (B); 13176 (UC); 29638 (PNH); 19258 (CAHUP). Pollinia wide and short, retinaculum with distinct head, waste area.

Pollinium

length	0.51 mm
widest	0.21 mm

Retinaculum

length	0.19 mm
shoulder	0.12 mm
waist	0.08 mm
hip	0.10 mm
ext.	0.05 mm

Translators

length	0.10 mm
--------	---------

widest 0.04 mm

Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Retinacula character: S

Hoya landgrantensis Kloppenburg 2009



Pollinarium
enlarged ca. 165x.

Pollinia

length 0.50mm.
widest 0.13 mm.

Retinacula

length 0.12 mm.
shoulder 0.11 mm.
waist 0.04 mm.
hip 0.06 mm.
ext. 0.04 mm.

Translator

length 0.09 mm.
depth 0.05 mm.
width 0.02 mm.

Caudicle

bulb diam. 0.06 mm.

Type: C



A second pollinarium enlarged ca. 145x. Retinacula is distinct with broad shoulders and spaced extensions. Caudicle bulb apex is broadly ovate and cupped upper surface of the translator arm is visible on the right translator.

Translator/caudicle type: ls/o
Pollinia inner end type: RT

Caudicle bulb: C
Retinacula character: S

Hoya coronaplana Kloppenburg & Mendoza
(unpublished) GM #131



Pollinarium enlarged ca.
120x

Pollinium

length 0.50 mm
widest 0.19 mm

Retinaculum

length 0.15 mm
shoulder 0.15 mm
waist 0.07 mm
hip 0.09 mm
ext. 0.04 mm

Translator

length 0.10 mm
wide 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: C ?

Retinacula character: S

Hoya cumingiana subsp. kamangongensis Kloppenburg &
Mendoza
(unpublished) GM #176



Pollinarium enlarged
150x

Pollinium

length	0.50 mm
widest	0.17 mm

Translator/caudicle type: ls/o

Pollinia apex type: T

Retinaculum

length	0.15 mm
shoulder	0.08 mm
waist	0.05 mm
hip	0.08 mm
ext.	0.02 mm

Caudicle bulb: C ?

Retinacula character: S

Translator

length	0.08 mm
widest	0.02mm

Caudicle

bulb diam.	0.05 mm
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Hoya cumingiana subsp. catanauanensis Kloppenburg & Mendoza



Above enlarged 120x

Pollinium
length 0.50 mm
widest 0.15 mm

Retinaculum
length 0.20 mm
shoulder 0.14 mm
waist 0.09 mm
hip 0.10 mm
ext. 0.05 mm

Translator
length 0.10 mm
widest 0.04 mm



Above enlarged 70x

Translator/caudicle type: ls/o most likely **Pollinia inner end type:** T (tapered)

Hoya teodymendozae Kloppenburg & Mendoza
(unpublished) GM #85



Pollinarium enlarged
ca. 170x.

Pollinium

length 0.48 mm
widest 0.19 mm

Retinaculum

length 0.18 mm
shoulder 0.08 mm
hip 0.05 mm
waist 0.07 mm
ext. 0.04 mm

Translator

length 0.07 mm
wide 0.01 mm

Caudicle

bulb diam. 0.05 mm

**Translator/caudicle
type:** ls/o

**Pollinia inner end
type:** RT

Caudicle bulb: G

**Retinacula
character:** E

Hoya sulitii Kloppenburg 2015

M. D. Sulit (PNH) 10147 15 April 1949 Mt. Katanglad, Bukidnion Prov. Mindoro. Flower creamy 1800 m. forest edge (roll 144 drawing 136). I had determined this to be *Hoya cardiophylla* but here the corolla is densely pubescent inside, which negates it being that species.



Pollinarium enlarged about 165x. The retinaculum is similar to that of *Hoya cardiophylla* but slightly different, also the pollinia are much shorter and the translators although attached well down are here curved inwardly.

Pollinia

length	0.48 mm
widest	0.19 mm

Retinaculum

length	0.26 mm
shoulder	0.12 mm
waist	0.05 mm
hip	0.10 mm

Translator

length	0.17 mm
depth	0.03 mm

Caudicle

bulb diameter	0.05 mm
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Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: C ?

Retinacula character: LS

W 2705 as *H. filiformis* not



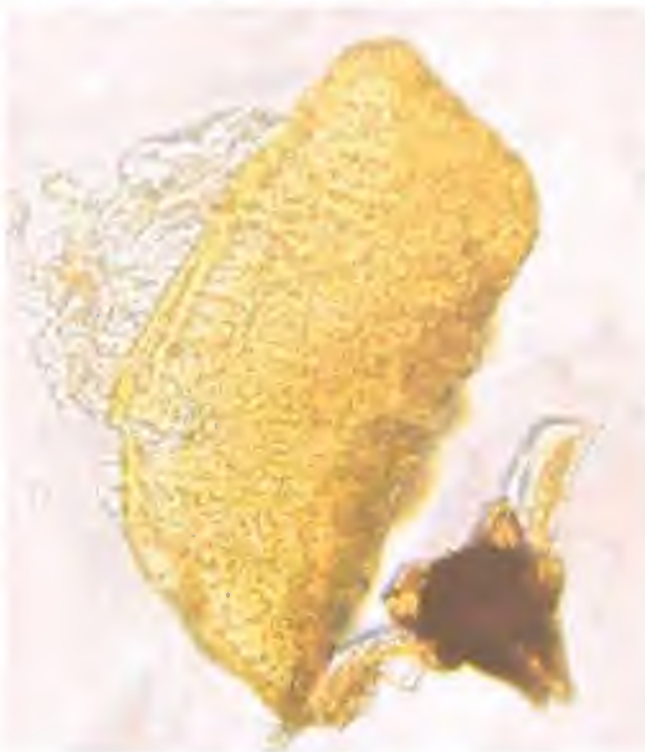
Pollinarium enlarged about 165x. The pollinium has germinated within the flower and the pollen tubes can be seen emerging along the pellucid edge of the pollinia. The retinaculum here is skewed so only a side view can be seen and the translators and caudicle are difficult to measure.

Pollinium

length	0.47 mm
widest	0.21 mm

Retinaculum

length	0.15 mm
shoulders	0.11 mm
hips	0.10 mm
waist	0.11 mm
extensions	0.04 mm



Another pollinarium with a better view of the retinaculum and the translators. Caudicle still hidden but linear (collapsed) on the right hand translator. Here the focus does not show the long head of the retinaculum, one of the intricacies of getting precise measurements and depictions of the shape of 3 dimensional complex structural objects.

Translator

length	0.11 mm
widest depth	0.05 mm

Structure is fiddle shaped in flat dimension. Pollen tubes in mass on left central side of pollinium.

Translator/caudicle: ls/o

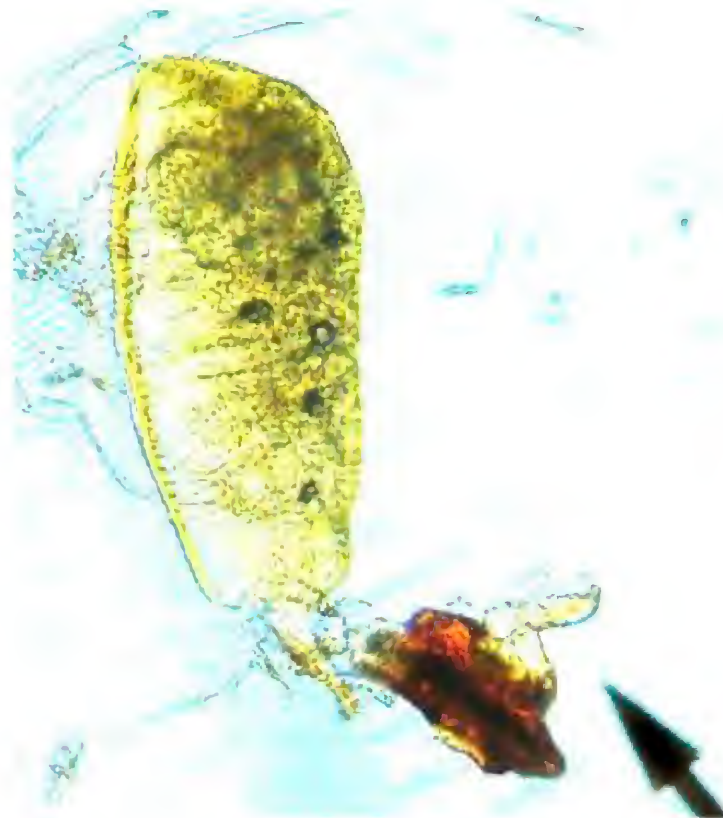
Pollinia inner end: T

Retinaculum: S

Caudicle bulb: G

Hoya tamaleana Kloppenburg 2008

sp. nova W 2705



Pollinarium enlarged about 165x. The pollinium has germinated within the flower and the pollen tubes can be seen emerging along the pellucid edge of the pollinia. The retinaculum here is skewed so only a side view can be seen and the translators and caudicle are difficult to measure.

Pollinium

length	0.47 mm.
widest	0.21 mm.

Retinaculum

length	0.15 mm.
shoulders	0.11 mm.
hips	0.10 mm.
waist	0.11 mm.
extensions	0.04 mm.

Another pollinarium with a better view of the retinaculum and the translators. Caudicle still hidden but linear (collapsed) on the right hand translator. Here the focus does not show the long head of the retinaculum, one of the intricacies of getting precise measurements and depictions of the shape of 3 dimensional complex structural objects.

Translator

length	0.11 mm.
widest depth	0.05 mm.

Translator Type: ls/o

Pollinia inner end type: F

Caudicle bulb: G

Retinacula character: S

Structure is fiddle shaped in flat dimension. Pollen tubes in mass on left central side of pollinium.



Hoya luatekensis Kloppenburg 2017

W 7605

Collected by Dr. Whistler Ta'u 19 Dec. 1990 flower white, elev. 350m.
Probably *Hoya whistlerii* Kloppenburg. Pollinia appears to be a little crumples so length more like 0.55 mm

W 7605 *H. whistlerii*



Pollinium enlarged about 165x.

length	0.47 mm
widest	0.20 mm

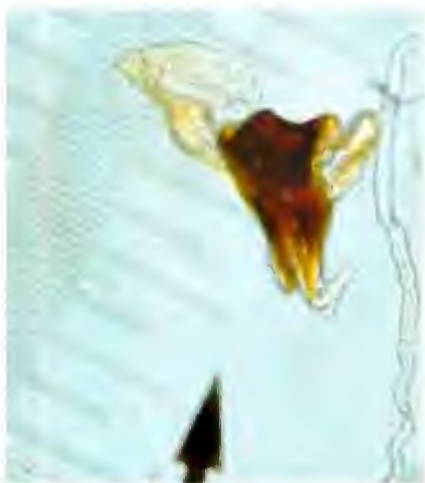
Retinaculum on the left with translators attached enlarged about 100x. The object is not laying flat, a little at an angle.

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: HU



Retinaculum also enlarged about 165x, again skewed with translator and caudicle on left side.

Retinaculum

length	0.17 mm
shoulders	0.14 mm
waist	0.06 mm
hip	0.09 mm
extensions	0.04 mm

Translator

length	0.18 mm
depth	0.06 mm

Caudicle bulb cup shaped (ascus) 0.16 x 0.06 mm

Hoya sp. PNH 5733

Collected by Barbon, Garcia & Sagcal at Samar Brg. Inuntan, Basey, 29 Jan 1992
studied 5 Nov. 1993.



Pollinarium enlarged
about 150x.

Pollinium

length 0.47 mm
widest 0.16 mm

Retinaculum

length 0.18 mm
shoulder 0.15 mm

Translators

length 0.10 mm
depth 0.02 mm

Caudicle

bulb diam. 0.07 mm

Translator Type: ls/o

**Pollinia inner end
type:** T

Caudicle bulb: G ?

Poring Hot Springs, Saba, Malaysia TG



Pollinium

length 0.47 mm
widest 0.15 mm

Retinaculum

length 0.18 mm
shoulder 0.09 mm
waist 0.05 mm
hip 0.08 mm
ext. 0.04 mm

Translator

length 0.12 mm
widest 0.03 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
ls/o

Pollinia inner end type: T

Retinacula character: LS

Hoya persicina subsp. triapexa Kloppenburg & Mendoza
(unpublished) GM #53



Pollinarium
enlarged ca. 140x.

Pollinium

length 0.46 mm
widest 0.19 mm

Retinaculum

length 0.13 mm
shoulder 0.16 mm
waist 0.10 mm
hip 0.14 mm
ext. 0.07 mm

Translator

length 0.08 mm
depth 0.03 mm

Caudicle

bulb diam. 0.07 mm

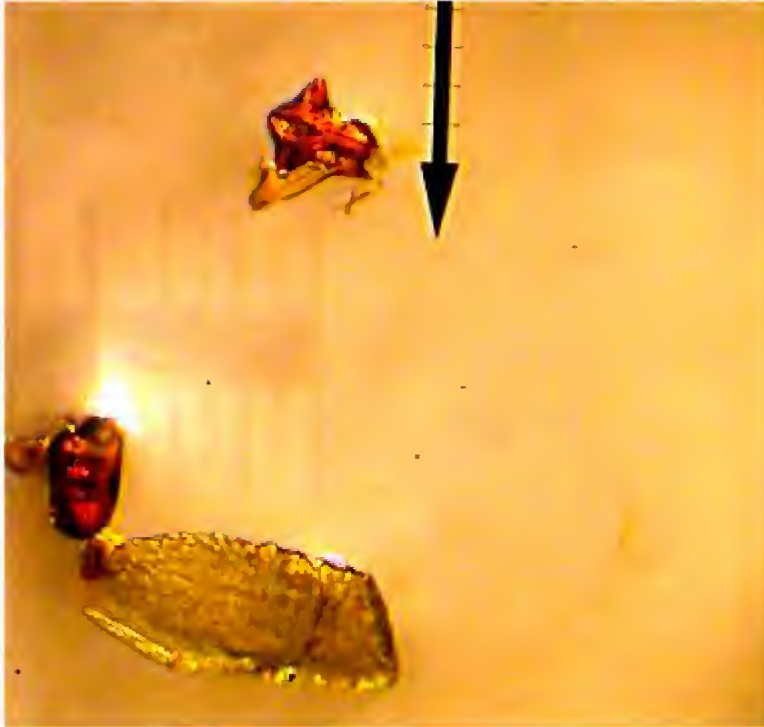
Translator/caudicle type: ls/o

Pollinia end type: T

Caudicle bulb: C

Retinacula type: S

Hoya blashernaezii subsp. diluta Kloppenburg & Cajano
(unpublished) AC pale #4 aff. siariae



Pollinaria enlarged ca. 100x. A composite of 2 pollinaria.

Pollinium

length 0.45 mm
widest 0.17 mm

Retinaculum

length 0.15 mm
shoulder 0.15 mm
waist 0.05 mm
hip 0.10 mm
ext. 0.02 mm

Translator

length 0.10 mm
wide 0.02 mm

Caudicle

bulb diam 0.07 mm

Translator/caudicle type: ls/o

Pollinia inner apex type: F

Caudicle bulb: ?

Retinacula character: S

Hoya corollanerva Kloppenburg & Mendoza
(unpublished) GM #157



Pollinarium
enlarged 200x

Pollinium

length 0.45mm
widest 0.20 mm

Caudicle

bulb diam. 0.05 mm

Retinaculum

length 0.15 mm
widest 0.15 mm
ext. 0.04 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: R

Translator

length 0.13 mm widest 0.03 mm

Pollinia Types 2017-1C

ls/o (cont.)

162. *Hoya myrmecopa* subsp. *kapatalanensis* Kloppenburg, Siar, Cajano, Guevarra & Carandang 2013
163. *Hoya persicina* subsp. *lalawinanensis* Kloppenburg & Mendoza
164. *Hoya crassicaulis* Elmer ex Kloppenburg 1995
165. *Hoya tamayensis* Kloppenburg & Mendoza
166. *Hoya* sp. IML 1056
167. *Hoya aurantiaca* Kloppenburg & Siar 2009 Type clone
168. *Hoya aurantiaca* subsp. *armenia* Kloppenburg & Mendoza
169. *Hoya samoaalbiflora* Kloppenburg 2017
170. *Hoya blashernaezii* Kloppenburg 1999
171. *Hoya olosegaensis* Kloppenburg 2017
172. *Hoya solaniflora* Schlechter 1913
173. *Hoya catanduanensis* Kloppenburg & Mendoza
174. *Hoya davidgoyderiae* Kloppenburg & Mendoza
175. *Hoya fitchii* Kloppenburg 2009
176. *Hoya liljebjorniana* Kloppenburg & Mendoza
177. *Hoya ralphdavisiae* Kloppenburg, Mendoza & Ferreras 2014
178. *Hoya blashernaezii* subsp. *maragondonensis* Kloppenburg & Mendoza
179. *Hoya opposita* G. Don 1837
180. *Hoya vicencioana* subsp. *quezonensis* Kloppenburg 2015
181. *Hoya blashernaezii* subsp. *ferrerasiana* Kloppenburg & Mendoza
182. *Hoya pimenteliana* Kloppenburg 1999
183. *Hoya* sp. Ramos & Edano 1927 (UC) 49395
184. *Hoya quinquinervia* Warburg 1904
185. *Hoya vicencioana* Kloppenburg, Siar, Cajano, Guevarra & Carandang 2013
186. *Hoya* sp. 349 (PNH)
187. *Hoya nuevaensis* Kloppenburg & Mendoza
188. *Hoya inawaensis* Kloppenburg & Mendoza
189. *Hoya heuschkeliana* subsp. *cajanoae* Kloppenburg & Siar 2001
190. *Hoya bordenii* Schlechter 1906
191. *Hoya macgregorii* Schlechter 1906
192. *Hoya inconspicua* Hemsley 1894
193. *Hoya blashernaezii* subsp. *carnea* Kloppenburg & Cajano
194. *Hoya nuuuliensis* Kloppenburg & Siar 2008
195. *Hoya blashernaezii* subsp. *eudaimononia* Kloppenburg & Mendoza
196. *Hoya* sp. PNH 11591 as *H. incrassata*
197. *Hoya* sp. *affinis australis* #941135
198. *Hoya histora* Kloppenburg 2015
199. *Hoya verticillata* (Vahl) G. Don 1837
200. *Hoya blashernaezii* subsp. *aurantiaca* Kloppenburg & Mendoza
201. *Hoya lasiantha* Korthals ex Blume 1848
202. *Hoya maximowayetii* Kloppenburg 2014
203. *Hoya baguioensis* Kloppenburg 2017

204. **Hoya sp.** PNH 39370 Quisimbing 1957
205. **Hoya mata-ole-afiensis** Kloppenburg 2015
206. **Hoya coronarosea** Kloppenburg & Mendoza
207. **Hoya multisepala** Kloppenburg & Mendoza
208. **Hoya blashernaezii subsp. parviora** Kloppenburg & Mendoza
209. **Hoya blashernaezii subsp. taiwanisensis** Kloppenburg & Mendoza
210. **Hoya papaschonii** Rodda 2014
211. **Hoya blashernaezii subsp. karenaseae** Kloppenburg & Mendoza
212. **Hoya blashernaezii subsp. marizae** Kloppenburg & Mendoza
213. **Hoya concava** Kloppenburg, Siar, Cajano & Carandang 2014
214. **Hoya carmelae** Kloppenburg, Siar & Ferreras 2010
215. **Hoya eburna subsp. rosea** Kloppenburg & Mendoza
216. **Hoya ginabrigidana** Kloppenburg & Mendoza
217. **Hoya foliapalmata** Kloppenburg & Mendoza
218. **Hoya crassicaulis** Elmer ex Kloppenburg 1995
219. **Hoya heuschkeliana subsp. mendozai** Kloppenburg
220. **Hoya navicula** Kloppenburg & Mendoza 2015
221. **Hoya auroraensis** Kloppenburg & Mendoza
222. **Hoya samarensis** Kloppenburg & Siar 2012
223. **Hoya coronarubra** Kloppenburg & Mendoza
224. **Hoya diptera** Seemann 1861
225. **Hoya latifolia** G. Don 1838
226. **Hoya marquisii** Kloppenburg & Mendoza
227. **Hoya heuschkeliana subsp. marionii** Kloppenburg & Ferreras 2014
228. **Hoya sp.** IML 850 affinis *H. macgregorii*
229. **Hoya camphorifolia** Warburg 1904 (not that sp.)
230. **Hoya williamsiana subsp. calendulina** Kloppenburg & Mendoza
231. **Hoya cyclaminea** Kloppenburg & Mendoza
232. **Hoya viscayaensis** Kloppenburg & Mendoza
233. **Hoya bakerensis** Kloppenburg & Mendoza
234. **Hoya marananiae** Kloppenburg, Siar, Guevarra & Carandang 2015
235. **Hoya nakarensis subsp. cadmia** Kloppenburg & Mendoza
236. **Hoya lagyoensis** Kloppenburg & Mendoza
237. **Hoya martinii subsp. daraitonensis** Kloppenburg & Mendoza
238. **Hoya martinii** Kloppenburg & Mendoza
239. **Hoya sp.** UC s.n. Taylor
240. **Hoya unruhiana** Klopp., Siar, Mend., Cajano, Guevarra & Carandang 2013
241. **Hoya subrosea subsp. inawaensis** Kloppenburg & Mendoza

Hoya myrmecopa subsp. kapatalanensis Kloppenburg, Siar,
Cajano, Guevarra & Carandang 2013



Pollinarium enlarged about 165x.

Pollinium

length 0.45 mm

widest 0.16 mm

Retinaculum

length 0.13 mm

should 0.12 mm

waist 0.08 mm

hip 0.09 mm

ext 0.05-.09 mm

Translator

length 0.12 mm

depth 0.02 mm

Caudicle

bulb 0.05 mm

Translator/caudicle type: ls/o

Pollinia inner apex type: RT

Caudicle bulb: C ?

Retinacula character: R

Hoya persicina subsp. lalawinanensis Kloppenburg & Mendoza
(unpublished) GM #138



Pollinarium enlarged ca.
100x.

Pollinium

length 0.45 mm
widest 0.19 mm

Retinaculum

length 0.12 mm
shoulder 0.14 mm
waist 0.06 mm
hip 0.10 mm
ext 0.05 mm

Translator

length 0.10 mm
wide 0.02 mm

Caudicle

bulb diam. 0.06 mm

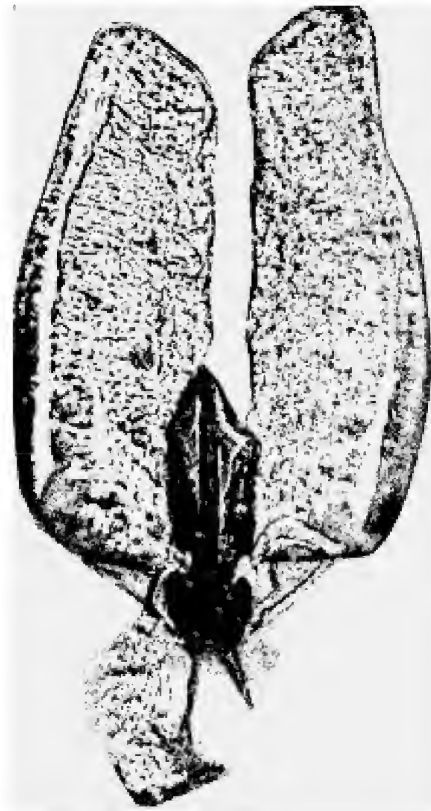
Translator/caudicle type:
ls/o

Pollinia inner apex type:
T

Caudicle bulb: C

Retinacula character: S

Hoya crassicaulis Elmer ex Kloppenburg 1995
Pollinarium from Edano 46116 (1925) Capiz Panay, Pasol River, Philippines.



Magnified approximately 165x.

Pollinium

length: 0.45 mm
widest: 0.14 mm

Retinaculum

length: 0.22 mm
shoulder: 0.08 mm
waist: 0.06 mm
hip: 0.08 mm
ext.: 0.05 mm

Translators

length: 0.09 mm
depth: 0.01 mm

Caudicle

bulb depth: 0.04 mm

Translator/caudicle type: ls/o

Pollinia inner apex type: T

Caudicle bulb: ?

Retinacula character: E

Hoya tamayensis Kloppenburg & Mendoza
(unpublished) GM #142



Pollinarium enlarged ca.
130x.

Pollinium

length 0.45 mm
widest 0.20 mm

Retinaculum

length 0.13 mm
shoulders 0.14 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.07 mm

Translator

length 0.10 mm
widest 0.02 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type: ls/o

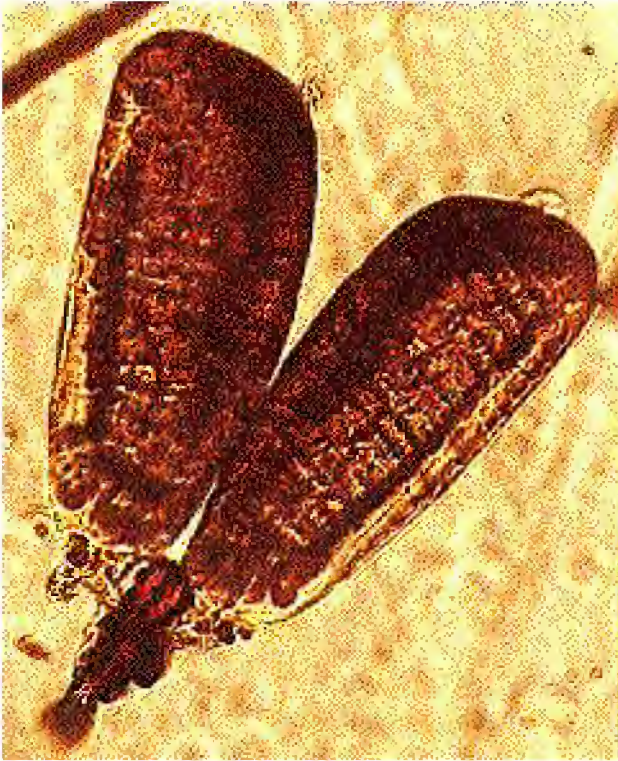
Pollinia inner end: T

Caudicle bulb: C

Retinacula character: S

Hoya sp. IML 1056

This is a fuzzy yellow bordered flower collected 9/8/00 at Ted Green's, Kaaawa Hawaii.



Pollinarium enlarged about 165x. The pollinia are relatively short and broad, rounded at both ends. The retinaculum is relatively narrow and the translators are short.

Pollinia

length	0.44 mm broad with rounded ends.
widest	0.19 mm

Retinaculum

length	0.13 mm to crotch.
shoulder	0.05 mm wide.
waist	slightly more narrow.
hips	slightly wider.
extensions	0.03 mm long

Translators

length	0.07 mm
widest	ca. 0.02 mm wide, dense.

Retinacula character: LS

Caudicles

bulb	ca. 0.04 mm in diameter, but difficult to measure, clear.
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Translator/caudicle type: ls/o

Pollinia inner end: RT

Caudicle bulb: G ?

Hoya aurantiaca Kloppenburg & Siar 2009 Type clone



Pollinium

length 0.44 mm
widest 0.19 mm

Retinaculum

length 0.11 mm
shoulder 0.15 mm.
waist none
hip. none
ext. 0.06 mm

Translator

length 0.10 mm
depth 0.02 mm

Caudicle

bulb diam. 0.05 mm

Type: C

Ratios: l/w 2.3
l/r 2.8

Translator/caudicle type: ls/o

Retinacula character: S

Pollinia inner end: R

Pollinarium with one pollinium missing enlarged about 165x.

Hoya aurantiaca subsp. armenia Kloppenburg & Mendoza
(unpublished) GM #124



Pollinarium enlarged ca.
170x

Pollinium

length 0.44 mm
widest 0.19 mm

Retinaculum

length 0.15 mm
shoulder 0.16 mm
waist 0.10 mm
hip 0.11 mm
ext. 0.05 mm

Translator

length 0.10 mm
wide 0.03 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
ls/o

Pollinia apex type: T

Caudicle bulb: G ?

Retinacula character: S

Hoya samoaalbiflora Kloppenburg 2017

W 3961

Collected by Dr. Whistler 29 Aug. 1978, Upolu, Samoa, elevation 1050m, flowers white.



Pollinarium parts enlarged about 165x, again I had difficult to recover the structure for the anthers were unusually attached under the stylar table and retinacula buried beneath and also very narrow so I could not get it to lay flat. Translator can be seen at the bottom end of the pollinia and the clear caudicle over the lower left side of the retinacula which is laying on its side.

Pollinium

length	0.44 mm
widest	0.21 mm

Retinaculum

overall length	0.21 mm
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Translator

length	0.09 mm
depth	0.02 mm

Caudicle

bulb diameter	0.07 mm
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Translator/caudicle type: ls/o

Pollinia apex type: R

W 3961 29 Aug. 1978 Upolu, Samoa originally as *H. filiformis* Reich. then as *Hoya betchei* Schltr. Dec. 1990. Neither sp.

Hoya bakyaanensis Kloppenburg & Mendoza
(unpublished) GM #149



Pollinarium enlarged 150x.

Pollinium

length 0.44 mm
widest 0.20 mm

Retinaculum

length 0.10 mm
shoulder 0.15 mm
waist 0.05 mm
hip 0.09 mm
ext. 0.06 mm

Translator

length 0.11 mm
wide 0.04 mm

Caudicle

bulb 0.06 mm

Translator/caudicle type:
d/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya blashernaezii Kloppenburg 1999

From cuttings collected by Hernaez, **Type** material 97094 (BISH).



Magnified 165x.

Pollinarium enlarged about 165x. The pollinia are short and broad, outer apical ends tapered inward. The retinaculum is broad and fat. Note here the light colored spots near the pollinia on the head of the retinaculum that are short horn-like projections, the extensions are large and well developed.

Pollinia

length	0.44 mm
widest	0.20 mm

Retinaculum

length	0.27 mm
shoulder	0.20 mm
waist	0.20 mm
hip	0.20 mm
ext.	0.11 mm

Translator

length	0.07 mm
depth	0.02 mm

Caudicle

bulb diam.	0.08 mm
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Hip area is only slightly curved inward, so only slight differences in measurements. Translators are exceptionally short.

Translator/caudicle type: ls/o

Pollinia apex type: F

Type: C

Retinacula character: LN

Hoya olosegaensis Kloppenburg 2017
W 3081 (HAW)

Retinaculum and translators enlarged about 165x.



Retinaculum

length	0.17 mm
shoulders	0.11 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.05 mm

Translator

length	0.13 mm
depth	0.03 mm



Retinacula type: S

Translator/caudicle: ls/o ?

Pollinium enlarged about 165x.
This structure did not remain with the caudicle and Retinaculum and may be skewed or flattened some. It appears to be distorted in the upper portion and the pellucid edge is barely visible.

Here the length is	0.44 mm
widest	0.18 mm

Hoya solaniflora Schlechter 1913

From the **Type #18214** *Hoya solaniflora* Schlechter (UC): Type 1200m forest of Finsterreich. (Window Mountains).



Pollinarium enlarged about 165x.

Translator/caudicle type: ls/o

Pollinia apex type: R

Retinacula character: S

Pollinarium is a result of multiple photos since the retinaculum

would not adhere to the pollinia or vice versa:

Pollinia short and thick

length	0.44 mm
widest	0.20 mm

Retinaculum

length	0.23 mm
shoulder	0.13 mm wide
waist	0.07 mm
hips	0.11 mm wide.
extensions extremely short.	

Translators

length	0.07 mm (very short and narrow). with a wide cupped top.
depth	0.03 mm

Caudicles

Probably large bulb ca. 0.12 mm in diameter.

Hoya catanduanensis Kloppenburg & Mendoza

(unpublished) GM #140

Pollinaria enlarged ca. 110x.



Pollinium

length	0.44 mm
widest	0.17 mm

Retinaculum

length	0.17 mm
shoulder	0.14 mm
waist	0.06 mm
hip	0.08 mm
ext	0.05 mm

Translator

length	0.10 mm
widest	0.02 mm

Caudicle

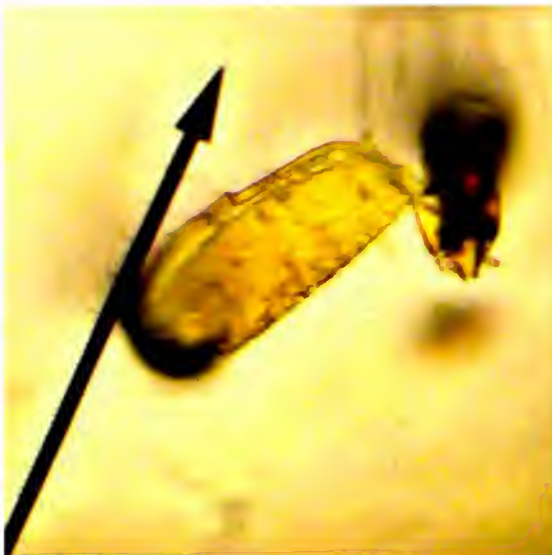
bulb diam.	0.05 mm
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Translator/caudicle type: ls/o

Pollinia inner apex type: T

Caudicle bulb: C ?

Retinacula character: S



Pollinarium with one pollinium missing enlarged ca. 100x.

Here to show more clearly the shape of the retinaculum here with the pollinium twisted on the axis.

Hoya davidgoyderiae Kloppenburg & Mendoza
(unpublished) GM #44



Pollinaria above enlarged ca. 122x.

Pollinium

length	0.43
widest	0.20

Translator

length	0.06
depth	0.02

Retinaculum

length	0.12
shoulder	0.10
waist	0.04
hip	0.05
ext.	0.08

Caudicle

bulb diam.	0.05
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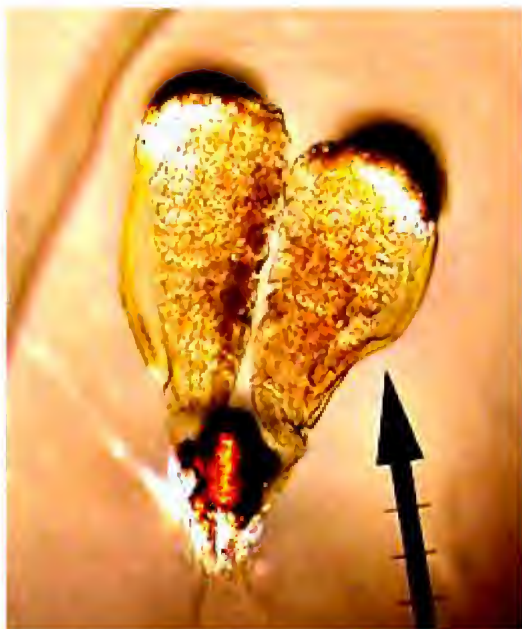
Translator/caudicle type: ls/o

Retinacula character: S

Pollinia inner end type: T

Caudicle bulb: C

Hoya fitchii Kloppenburg 2009



Pollinarium picture taken with a Epson Digital camera taken through the lens of a Bosch & Lomb microscope at 400x magnification. The measurement arrow head is 0.1 mm long as is the distance between lines on the shaft., head is 0.5 mm wide. very sharp focus.

Pollinarium

length	0.43 mm
widest	0.17 mm

Retinaculum

length	0.11 mm
shoulder	0.12 mm
waist	0.07 mm
hip	0.08 mm
ext.	0.05 mm

Ret.:Pol. ratio 1:3.5

Translator

length	0.10 mm
width	0.01 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: G ?

Retinacula character: S

This species has a pollinarium that differs from the type and from Dr. Schlechter's drawing. In his sp. the pollinium are less than twice as long as the retinaculum, in this sp. it is over 3 times longer. The pedicels here are a little shorter, the flower diameter a little less, the calyx less linear, and here the coronal lobes are essentially horizontal, the outer lobes are not raised as in *Hoya cagayanensis*.

Hoya liljebjorniana Kloppenburg & Mendoza
(unpublished) GM #43



Pollinarium enlarged ca. 140x

Pollinarium

length	0.43 mm
widest	0.18 mm

Translator

length	0.10 mm
depth	0.03 mm

Retinaculum

length	0.15 mm
shoulder	0.14 mm
waist	0.06 mm
hip	0.10 mm
ext	0.03 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Hoya ralphdavisiae Kloppenburg, Mendoza & Ferreras 2014



Pollinarium enlarged 160x.

Pollinium

length 0.43 mm
widest 0.18 mm

Retinaculum

length 0.15 mm
shoulder 0.15 mm
waist 0.07 mm
hip 0.10 mm
ext. 0.07 mm

Translator

length 0.11 mm
widest 0.03 mm

Caudicle

bulb diam. 0.05 mm

Caudicle is clear
Pollinia ends are tapered.

Translator/caudicle type:

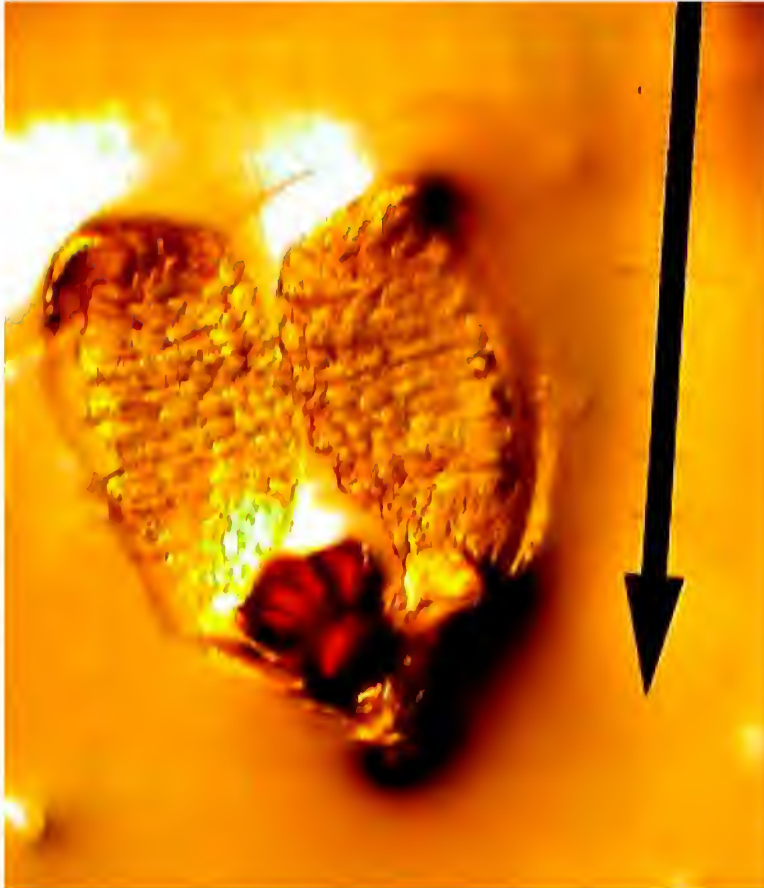
ls/o

Pollinia inner end type: F

Caudicle bulb: C

Retinacula character: S

Hoya blashernaezii subsp. maragondonensis Kloppenburg &
Mendoza
(unpublished) GM #99



Pollinarium enlarged ca.
150x

Pollinium

length 0.43 mm
widest 0.25 mm

Retinaculum

length 0.14 mm
shoulder 0.15 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.02 mm

Translator

length 0.11 mm
wide 0.02 mm

Caudicle

bulb diam. 0.07 mm

Translator/caudicle: ls/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

The pollinia in some of my photos appear to be slumped on the outer ends, the lower pollinarium seems to have one pollinia (the upper one) that is not slumped, so I use this for measurements.

Hoya opposita G. Don 1837



Pollinarium enlarged about 165x. This is a short, wide pollinia. (A extraneous skin cell? membrane at the base) Retinaculum is turned a little on its side. The arrow below is 1 mm long and the top ½ mm wide for comparison.

Again as in *Hoya verticillata* (Vahl) Don the pollinia is very wide and short, apex truncate, also a wide vacuole.

Pollinia	
length	0.43 mm
widest	0.16 mm
Retinaculum	
length	0.15 mm
shoulder	0.10 mm
waist	0.05 mm
hip	0.07 mm
extensions	0.05 mm
Translator	
length	0.07 mm
width	0.02 mm



The retinaculum is very distinct here, translators are fiddle-form and the caudicles are barely visible, covering the end of the pollinia and to the left just visible and translucent. The retinaculum seems to have no differentiated dark extensions but the structure is there below. Shoulder, waist and hip areas clearly discernable.

Translator/caudicle: ls/o

Pollinia inner end type: R

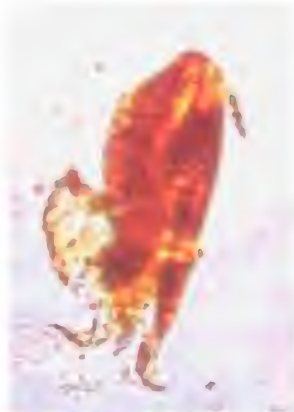
Caudicle bulb: G ?

Retinacula character: S

Hoya vicencioana subsp. quezonensis Kloppenburg 2015

CAHUP 5294, Hernaez

17 March 2000, UP Landgrant, Quezon, Philippines. Photo and data 3/29/99.



Retinaculum and extensions well developed, inner apex rounded, with translator on left side attached well down on side.

I can not determine measurements as I have no scale showing in photo.



Pollinium has germinated apex rounded inner apex narrowing and also obtuse.

It is 0.42 mm long. and ca. 0.15 mm at the widest.



Another photo of a pollinarium. Here the pollinium seems to measure 0.40 mm long and 0.16 mm at the widest.

Hoya blashernaezii subsp. ferrerasiana Kloppenburg & Mendoza
(unpublished) GM #134



Pollinium enlarged ca. 144
x

Pollinium

length	0.42 mm
widest	0.20 mm

Retinaculum

length	0.10 mm
shoulder	0.15 mm
waist	0.09 mm
hip	0.10 mm
ext.	0.06 mm

Translator

length	0.10 mm
widest	0.04 mm

Caudicle

bulb diam.	0.06 mm
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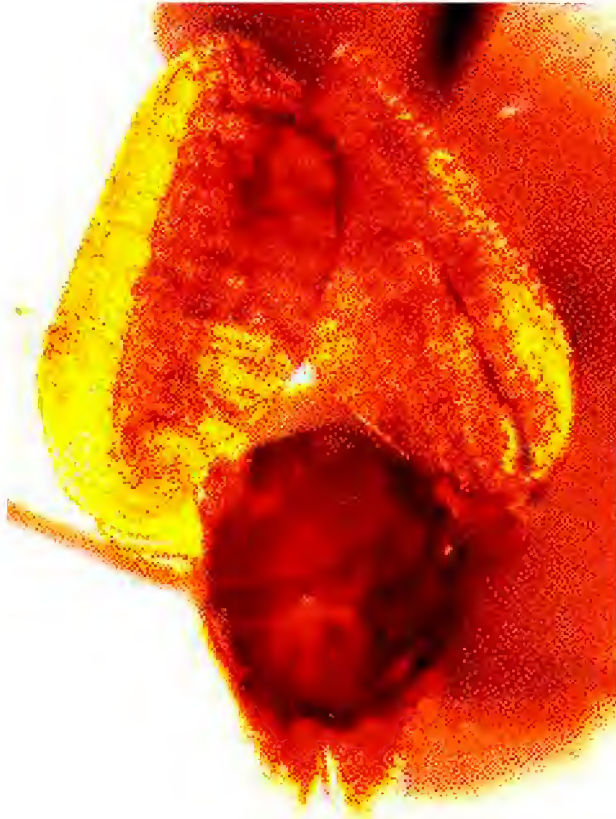
Translator/caudicle type: ls/o

Pollinia apex type: F

Caudicle bulb: C

Retinacula character: S

Hoya pimenteliana Kloppenburg 1999 Type clone



Pollinarium approximately
165x.

Pollinium

length	0.42 mm
widest	0.20 mm

Retinaculum

length	0.24 mm
shoulder	0.20 mm
hip	0.20 mm
ext.	0.11 mm

Translators

length	0.19 mm
depth	0.01 mm

Caudicle

bulb diam.	0.19 mm
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Type: G

Translator/caudicle type: ls/o

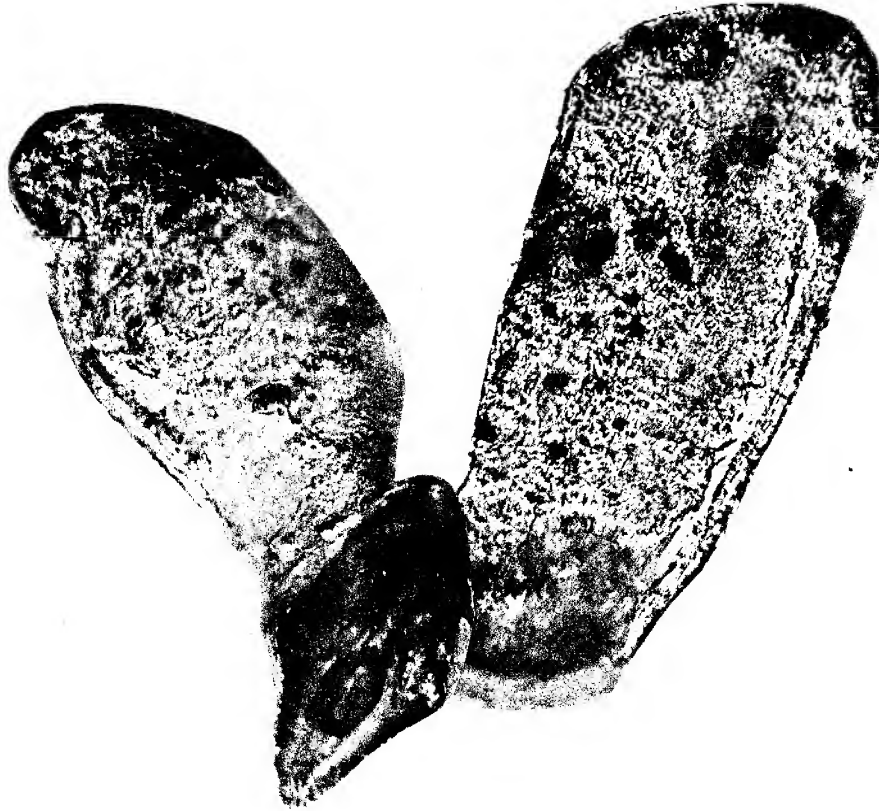
Pollinia apex type: T

Caudicle bulb: G

Retinacula character: LN

Hoya sp. Ramos & Edano 1927 (UC) 49395

Labeled *Hoya fischeriana* Warburg
Mt. Mayo, Mindanao, Philippines.



Magnified approximately 165x.

Pollinium

length: 0.42 mm
widest: 0.18 mm

Retinaculum

length: 0.23 mm
shoulder: 0.15 mm
waist: 0.08 mm
hip: 0.17 mm
ext.: 0.04 mm

Translators

length: 0.18 mm
depth: 0.03 mm

Caudicle

bulb. diam.: 0.09 mm.

Translator/caudicle type: ls/o

Retinacula character: HE

Pollinia apex type: R

Caudicle bulb: ?

Hoya quinquinervia Warburg 1904

Grown and flowered in Fresno, CA. from clone 81100 JP.



Pollinarium (1/2) which is enlarged approx. 165 times already starting to germinate (note pollen tubes on rt. side and above in background. The pollinia top is tapered inward and broad. Here the broad head of the retinaculum is partially visible and its distinct waist and hip area. The translator (rather narrow) and the caudicle seem to arise from below the Waist.



Pollinium

length: 0.42 mm
widest: 0.16 mm

Retinaculum

length: 0.13 mm
shoulder: 0.10 mm
waist: 0.06 mm
hip: 0.08 mm
ext.: 0.02 mm

Translators

length: 0.09 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.05 mm

Magnified approximately 165x.

Translator/caudicle type: ls/o

Retinacula character: S

Pollinia apex type: F

Caudicle bulb: G

Hoya vicencioana Kloppenburg, Siar, Cajano, Guevarra &
Carandang 2013 **Type** clone
ISSN 10055-4564



Pollinarium enlarged ca. 100x

Pollinium

length 0.42 mm
widest 0.15 mm

Retinaculum

length 0.15 mm
shoulder 0.17 mm
waist 0.10 mm
hip 0.15 mm
ext. 0.10 mm

Translator

length ca. 0.10 mm

Caudicle

bulb diam. 0.10 mm

Ratios: p/r 2.8 p/w 2.8

Translator/caudicle type: ls/o ?

Pollinia inner apex type: R

Caudicle bulb: ?

Hoya sp. 349 (PNH)

Collected by G. E. Edano, Bacungan, Puerto Princessa, Palawan, Philippines 28 Mar. 1947. Notations. Found on tree trunk in forest at seal level.



Pollinarium
enlarged about 165x.

Pollinium

length	0.41 mm
widest	0.19 mm

Translator/caudicle type: ls/o ?

Pollinia type: E

Retinaculum

length	0.21 mm
shoulder	0.11 mm
waist	0.09 mm
hip	0.10 mm
ext	0.03 mm close bifid apex

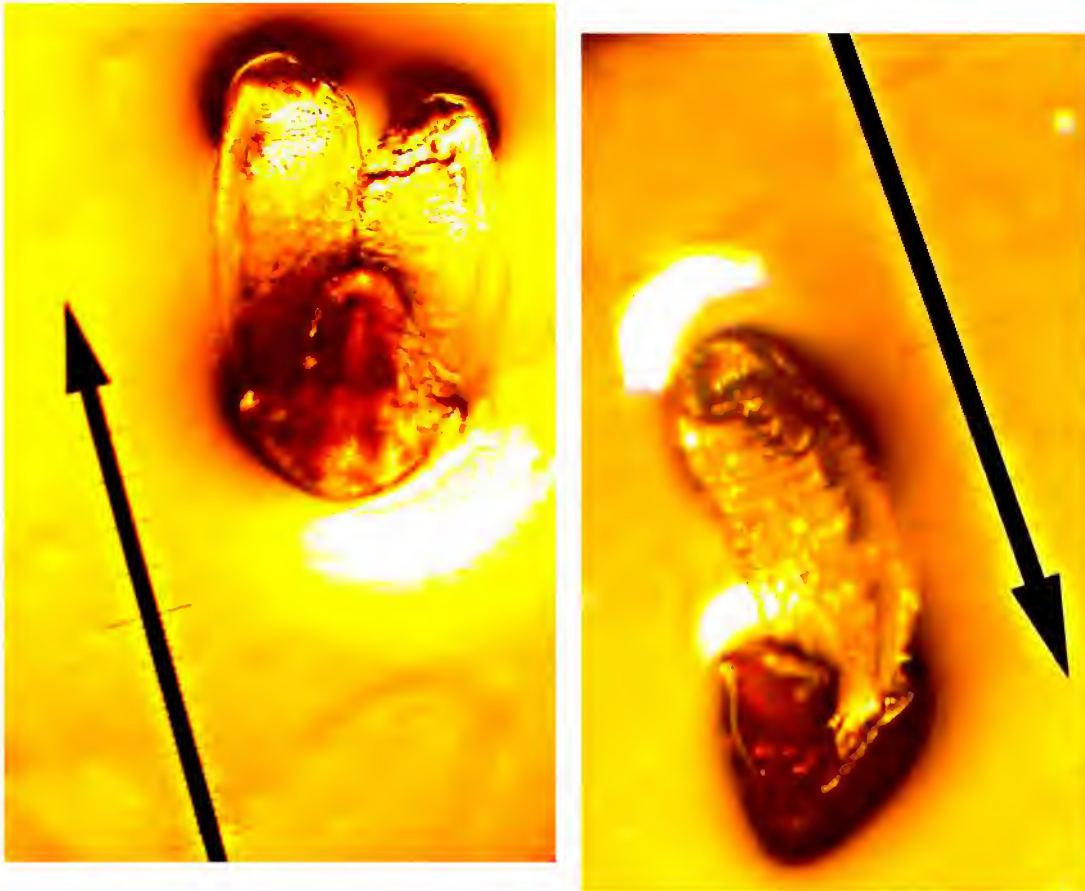
Retinaculum Type: R

Translators very short and tight.

length	0.11 mm
depth	0.02 mm

Caudicle bulb diam 0.04 mm ca.

Hoya nuevaensis Kloppenburg & Mendoza
(unpublished) GM #108



Pollinaria enlarged (left) 110x and (right) 130x.

Pollinium

length	0.41 mm
widest	0.18 mm

Translator

length	0.17 mm
wide	0.08 mm

Retinaculum

length	0.18 mm
shoulder	0.12 mm
waist	0.10 mm
hip	0.12 mm
ext	0.05 mm

Translator/caudicle type: ls/o

Pollinia inner ends: R

Caudicle bulb: G ?

Retinacula type: S

Hoya inawaensis Kloppenburg & Mendoza
(unpublished) GM #156



Pollinarium enlarged 158x.

7Pollinia

length	0.40 mm
widest	0.19 mm

Translator

length	0.10 mm
wide	0.03 mm

Caudicle bulb diameter 0.05 mm

Retinaculum

length	0.12 mm
shoulder	0.13 mm
waist	0.07 mm
hip	0.09 mm
ext.	0.05 mm

Pollinia inner apex type: R

Retinacula character: S

Translator/caudicle type: ls/o

Hoya heuschkeliana subsp. cajanoae Kloppenburg & Siar 2007

Type clone



Pollinarium enlarged about 165x.

Pollinia inner apex type: R

Translator/caudicle type: ls/o

Retinacula character: LN

Pollinium

length	0.40 mm
widest	0.21 mm

Retinaculum

length	0.20 mm to extensions
widest	0.14 mm
ext.	0.07 mm

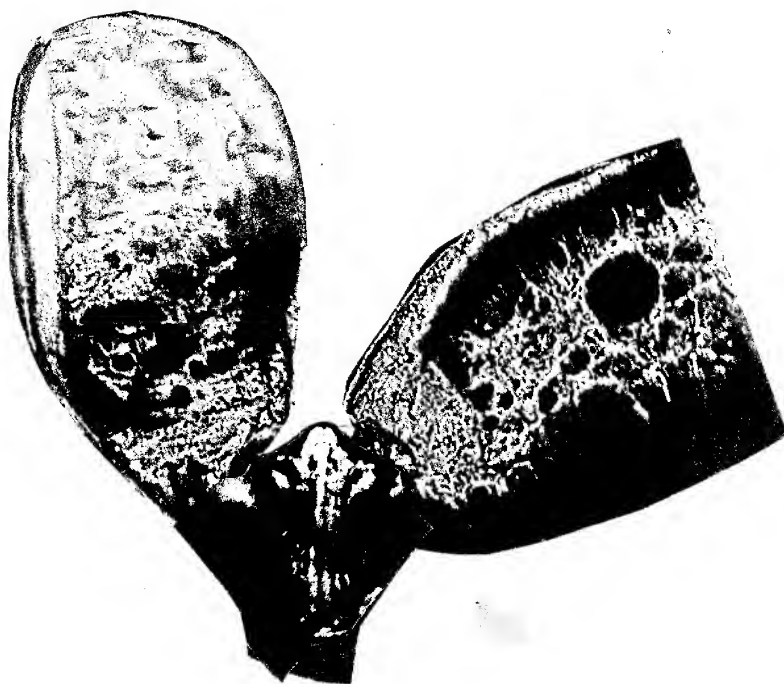
Translators

length	0.10 mm
depth ca.	0.05 mm

Caudicle

Type: Clear	
bulb diam.	0.07 mm as near as I can determine.

Hoya bordenii Schlechter 1906
Clone UC 15829, 1916 Irosin, Sorsegon, Luzon Philippines.



Magnified
approximately 165x.

Pollinium

length: 0.40 mm
widest: 0.24 mm

Retinaculum

length: 0.16 mm
shoulder: 0.12 mm
waist: 0.07 mm
hip: 0.08 mm
ext.:

Translators

length: 0.11 mm
depth: 0.03 mm

Caudicle

bulb. diam.: 0.05 mm

Pollinia inner apex type: R

Retinacula character: S

Translator/caudicle type: ls/o

Hoya macgregorii Schlechter 1906

Clone PNH 15541, Edano 1952, Mt. Katanglad, Samar, Philippines.



Magnified approximately 165x.

Pollinarium enlarged about 165x.
Note that this species has horns on the head.

Pollinia

length	0.40 mm
widest	0.15 mm

Retinaculum

length	0.15 mm overall
Shoulder	0.12 mm
waist	0.10 mm
hip	0.10 mm +
ext.	0.07 mm

Translator

length	0.08 mm
depth	0.02 mm

Caudicle

bulb diam.	0.04 mm
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Type: G

Pollinia inner apex type: F

Translator/caudicle type: ls/o

Caudicle bulb: G

Retinacula character: HU

Hoya inconspicua Hemsley 1894

Source clone personally collected from Honiara Botanical Garden
Guadalcanal, Solomon Islands 1988.



Pollinarium enlarged about 165x. The apex of the pollinia are truncate, sloping inward. The caudicles are extremely large with narrow translators. See the inner apex stuck into the clear caudicles (apex showing through). The retinacula has large hip area and short widely separated extensions.

Pollinia inner apex type: F

Translator/caudicle type: l/o

Caudicle bulb: C

Retinacula character: E ?

Note the translator/caudicle type is intermediate ie. transitional characters caudicles almost cw type

Pollinia

length	0.40 mm
widest	0.15 mm

Retinaculum

length	0.10 mm
shoulder	0.04 mm
waist	0.03 mm
hip	0.07 mm
extensions	0.03 mm

Translator

length	0.17 mm
depth	0.03 mm

Caudicle

bulb diam.	0.07 mm
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Hoya blashernaezii subsp. carnea Kloppenburg & Cajano
(unpublished) AC #3



Two photos of the pollinia as best as I could get from 2 flowers. The top one enlarged about 110x; lower one less. The top photo shows the retinaculum best and the lower one the pollinarium



Pollinium

length 0.40 mm
widest 0.22 mm

Retinaculum

length 0.15 mm
shoulder 0.13 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.05 mm

Translator

length 0.07 mm
wide 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type: ls/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Hoya nuuuliensis Kloppenburg & Siar 2008



Pollinarium enlarged about 150x.

Pollinia

length	0.40 mm
widest	0.22 mm

Retinaculum

length	0.13 mm
shoulder	0.11 mm
waist	0.09 mm
hip	0.10 mm
ext.	0.05 mm

Translator

length	0.10 mm
depth	0.05 mm

Caudicle

bulb diam.	0.07 mm
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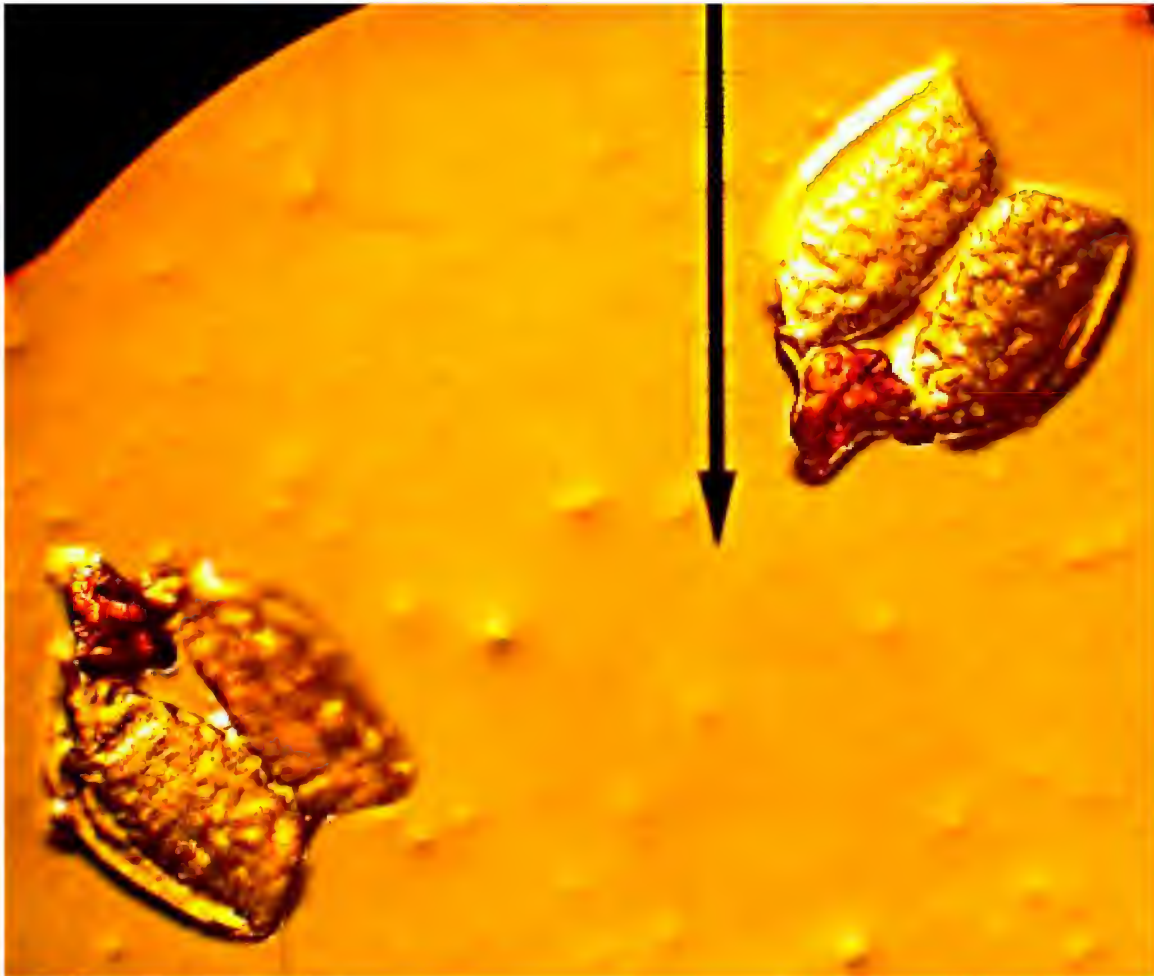
Translator/caudicle type: ls/o

Pollinia inner end type: RF

Caudicle bulb: G

Retinacula character: S

Hoya blashernaezii subsp. eudaimononia Kloppenburg &
Mendoza
(unpublished) GM #68



Pollinarium enlarged ca. 100x.

Pollinium

length	0.40 mm
widest	0.20 mm

Caudicle

bulb diam	0.03 mm
	.

Retinaculum

length	0.15 mm
shoulder	0.15 mm
waist	0.05 mm
hip	0.06 mm
ext	none ?

Translators

length	0.05 mm
--------	---------

Retinacula character: S

Translator/caudicle type: ls/o

Pollinia end type: F

Caudicle bulb: G

Hoya sp. PNH 11591 as *H. incrassata*

Not correct



Pollinarium enlarged about 155x.

Pollinium

length	0.40 mm.
widest	0.15 mm.

Retinaculum

length	0.17 mm.
shoulder	0.15 mm.
waist	0.06 mm.
hip	0.10 mm.
ext.	0.05 mm.

Translators

length	0.05 mm.
depth	0.03 mm.

Caudicle

bulb diam. 0.06 mm.

Translator/caudicle type:
ls/o

Pollinia inner end type: T

Retinacula character: LS

Hoya sp. affinis australis #941135

Balasiki Island, Central Sulawesi



Pollinarium enlarged about 39x. This is near the pollinaria found in *H. australis* with some minor differences, it is definitely related to this complex, however the coronal processes are entirely different in many ways. Here the extensions on the retinaculum are for the most part more deeply divided.

Pollinium

length	0.40 mm
widest	0.17 mm

Retinaculum

length	0.16 mm
shoulder	0.11 mm
waist	0.08 mm
hip	0.09 mm
extensions	0.07 mm. visible to 0.14 mm

Translators

length	0.13 mm
depth	0.02 mm
width ca.	0.01 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: HE

Hoya histora Kloppenburg 2015
sp. CAHUP #5292



Above pollinarium greatly enlarged. See scale for measurements. Black arrow head is 0.1 mm long base 0.05 mm wide. main markings on stem also 0.5 cm intervals .

Pollinarium

length	0.40 mm
widest	0.15 mm

Retinaculum

length	0.19 mm
shoulder	0.06 mm
waist	0.04 mm
hip	0.08 mm
ext.	0.02 mm

Translator

length	0.15 mm
depth	0.02 mm

Caudicle

bulb diam.	0.07 mm
------------	---------

Translator/caudicle type: ls/o

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: E

Hoya verticillata (Vahl) G. Don 1837

Type specimen:



Retinaculum enlarged about 165x.

length	0.18 mm
shoulder	0.10 mm
waist	0.05 mm
hips	0.06 mm
extensions	0.05 mm or maybe none.

Translators

length	0.05 mm
depth	0.04 mm



Pollinia enlarged about 165x.

Remember this is from a plant probably mounted in 1804, so it is nearly 200 years old. Here it is a bit distorted but we can see there is a rather wide vacuole in from the pellucid edge and the pollinia is rather wide for its length.

length	0.39 mm
widest	0.18 mm

I suppose the pollinia actually may measure slightly longer. All the measurements here are smaller than any of the *Hoya acuta* Haw. group, that I have grown or collected and studied. Data on all pollinaria will be presented further on. The Pollinarium measurements fit no other known hoyia species familiar to me.

Translator/caudicle type: Probably ls/o

Pollinia inner apex type: T

Caudicle bulb: G ?

Retinacula character: S

Hoya blashernaezii subsp. aurantiaca Kloppenburg & Mendoza
(unpublished)



Pollinarium enlarged ca.
180x.

Pollinium

length 0.38 mm
widest 0.20 mm

Retinaculum

length 0.16 mm
shoulder 0.15 mm
waist 0.09 mm
hip 0.10 mm
ext. 0.05 mm

Translator

length 0.15 mm
wide 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle: ls/o

Pollinia inner end: R

Retinacula: S

Hoya lasiantha Korthals ex Blume 1848

Flower via Torill Nyhuus, Sweden.

Pollinarium, long tapering head, shoulder and waist not well defined; hip with curved edges rounded inwardly near waist. Extensions curved outward and very narrow.

This is a photomicrograph of a flower sent by Torill Nyhuus. The pollinia are slightly shriveled from being in alcohol. Note however that there is a narrow distinct translator that widens as it nears the retinaculum. The clear caudicles are rather large. The

vacuoles are rather large. Distinctive are the two dark sharp pointed extensions that arise from the top of the retinaculum and point inward. I have observed this only in one other hoyia species (*Hoya phyllura* Swartz) and they're not as distinct.



Vacuole.

Sharp protrusion from upper side of retinaculum.

Granular caudicle.

Dark translator arm.

Pollinium

length	0.38 mm
widest	0.13 mm

Retinaculum

length	0.19 mm
shoulder	0.08 mm
waist	0.07 mm
hip	0.08 mm
extensions	0.03 mm

Translators

length (curved)	0.09 mm
depth	0.01 mm

Caudicles

bulb diameter	0.05 mm
---------------	---------

Translator/caudicle type: ls/o

Pollinia inner apex type: R

Caudicle bulb: G

Retinacula character: LS

Hoya maximowayetii Kloppenburg 2014

CAHUP 5271 Collected by Maximo Wayet at Benguet Village, Querino, Luzon,
Philippines
Photos 19 April 2006



Pollinaria both with one pollinium missing and retinaculum twisted a little on both. Head of arrow is 0.1 mm long.

Pollinium

length	0.38 mm
widest	0.15 mm

Retinaculum

length	0.16 mm
shoulder	0.13 mm
hip	0.04 mm
waist	0.05 mm
ext.	0.04 mm

Measurements of the retinacula are close approximations. Can not determine length of the translators, although they are short, nor the caudicle bulb diameter.

Ratio: Re. to Pollinium 1:1.7

Translator/caudicle type: ls/o

Pollinia inner apex type: T

Caudicle bulb: ?

Hoya baguioensis Kloppenburg 2017

CAHUP 5270

Photographed on 5/20/06 at Fresno, CA. Collected by Maximo Wayet at Baguio Village, Querino, elev. 150m, 6 Jan. 1990. Leaf large palmate, 18 x 2.3 cm. petiole .27 cm. grooved above. Peduncle 2.0 cm. with double rachis 0.2 cm. long.



Pollinarium
enlarged about
165x.

One retinaculum
turned on the axis
but I was able to
find a second
retinaculum.

Pollinium

length 0.37 mm
widest 0.14 mm

Retinaculum

length 0.16 mm
shoulder 0.12 mm
waist 0.06 mm
hip 0.08 mm
ext. 0.05 mm

Translator

length 0.11 mm
depth 0.04 mm

Caudicle

Bulb diam 0.05mm.

Translator/caudicle type: ls/o ?

Pollinia inner apex type: RT

Caudicle bulb: ?

Retinacula character: HU/RT

Hoya sp. PNH 39370 Quisimbing 1957
From Mona's Garden, Manila, Philippines.

Magnified approximately 165x.



Pollinium

length: 0.37 mm
widest: 0.16 mm

Retinaculum

length: ca. 0.12 mm
shoulder: 0.11 mm
waist: 0.06 mm
hip: 0.10 mm
ext.: 0.02 mm

Translators

length: 0.11 mm
depth: 0.01 mm

Caudicle

bulb. diam.: 0.06 mm

Translator/caudicle type: ls/o

Pollinia inner apex type: R

Caudicle bulb: ?

Hoya mata-ole-afiensis Kloppenburg 2015

W 2643

Collected by Dr. Art Whistler Savai'i, Samoa 3 June 1975, elevation 1550 m. Flowers white

Pollinarium and second retinaculum enlarged about 165x. The inner edges of the pollinia are a little shriveled. The translators are long cupped on top, the caudicle is small: both enter the retinaculum at the waist area. the extensions are long.



Pollinia

length	0.37 mm
widest	0.18 mm

Retinaculum

length	0.15 mm
shoulders	0.12 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.05 mm

Caudicle

bulb diameter	0.04 mm
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Translator/caudicle type: ls/o

Pollinia inner apex type: F

Caudicle bulb: G

Retinacula character: S

W 2643 3 June 1957. As shown *Hoya filiformis* Reich, relabeled *H. beitchei* Schltr. Ded. 1990. Possibly *H. filiformis*

Hoya coronarosea Kloppenburg & Mendoza
(unpublished)



Pollinarium enlarged ca.
150x.

Pollinium

length	0.37 mm
widest	0.15 mm

Retinacula

length	0.18 mm
shoulder	0.16 mm
waist	0.08 mm
hip	0.09 mm
ext	0.08 mm

Translator

length	0.10 mm
wide	0.01 mm

Caudicle

bulb diam.	0.04 mm
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Translator/caudicle type:
ls/o

Pollinia inner ends: R

Retinacula: S

Caudicle: C

Hoya multisepala Kloppenburg & Mendoza
(unpublished) GM #97



Pollinarium enlarged ca.
180x.

Pollinarium

length	0.37 mm
widest	0.18 mm

Retinaculum

length	0.16 mm
shoulder	0.14 mm
waist	0.10 mm
hip	0.14 mm
ext.	0.03 mm

Translator

length	0.10 mm
depth	0.02 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type:
ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S

Hoya blashernaezii subsp. parviora Kloppenburg & Mendoza
(unpublished) GM #116



Pollinarium
enlarged ca. 140x.

Pollinium

length	0.36 mm
widest	0.21 mm

Translator

length	0.05 mm
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Retinaculum

length	0.15 mm
shoulder	0.15 mm
waist	0.11 mm
hip	0.14 mm

Caudicle

bulb diam.	0.06 mm
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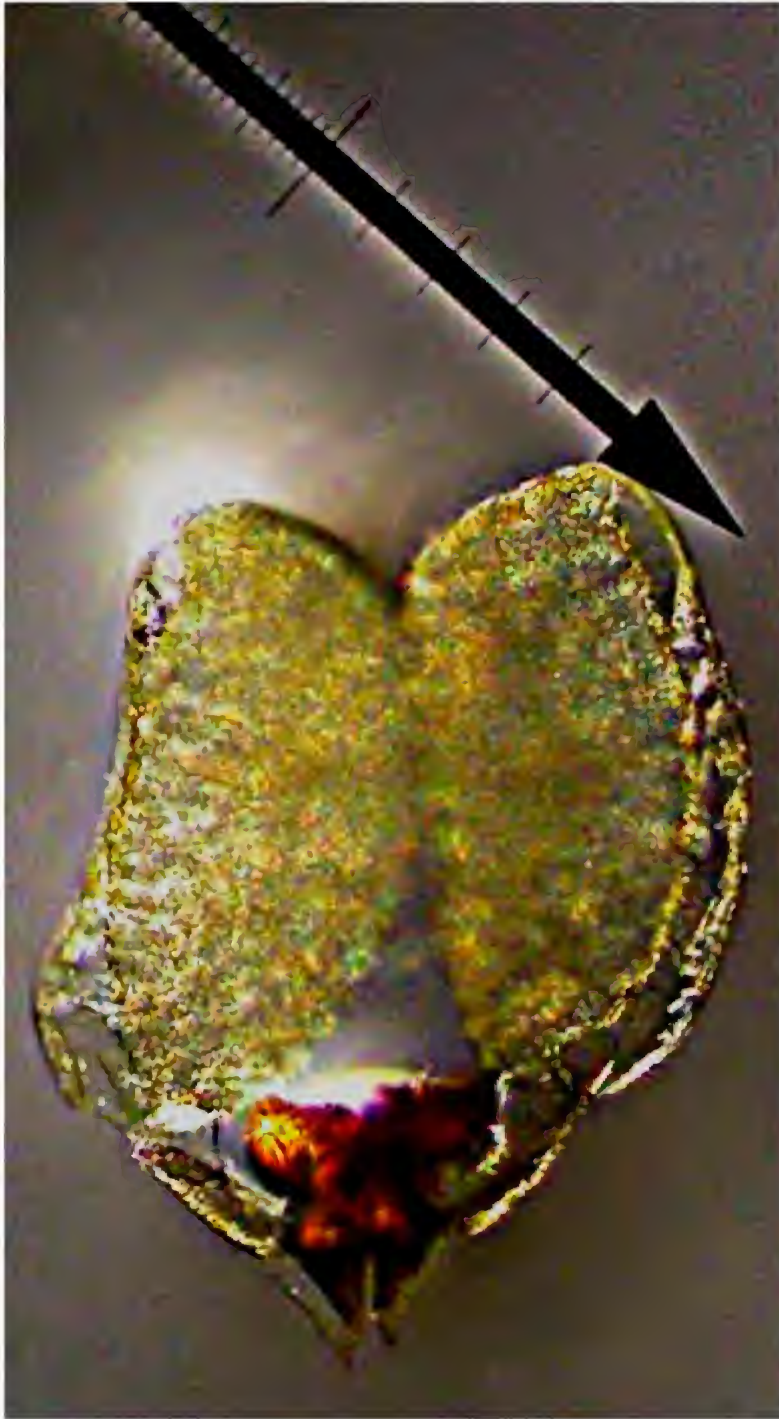
Translator/caudicle Type: ls/o ?

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: LH

Hoya blashernaezii subsp. taywanisensis Kloppenburg &
Mendoza
(unpublished) GM #159



Pollinarium enlarged
201x.

Pollinium

length 0.36 mm
widest 0.20 mm

Retinaculum

length 0.10 mm
shoulder 0.17 mm
waist 0.09 mm
hip 0.12 mm
ext. 0.05 mm

Translator

length 0.11 mm
widest 0.03 mm

Caudicle

bulb diam. 0.05 mm

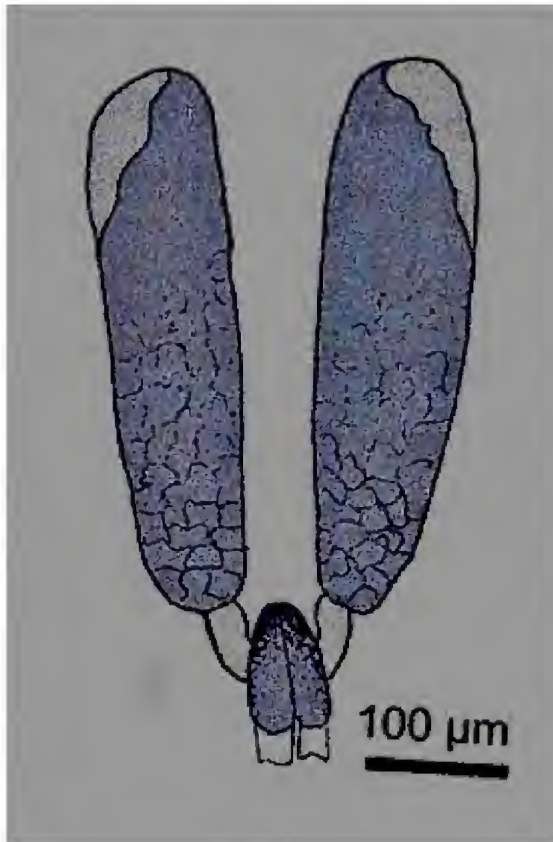
Translator/caudicle type:
ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S

Hoya papaschonii Rodda 2014



Pollinarium (a drawing)

Pollinia

length: 0.36 mm
widest: 0.10 mm

Retinaculum

length: 0.08 mm
shoulder: ca. 0.06 mm
waist: ca.
ext.: 0.02 mm

Translators

length: 0.07 mm
depth: 0.02 mm

Caudicle

bulb diam.: not drawn

Translator/caudicle type: ls/o ?

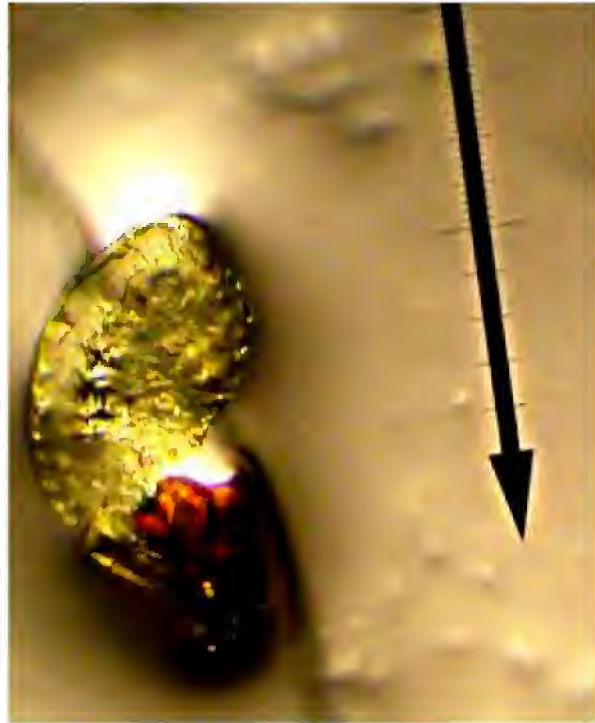
Pollinia apex type: R

Caudicle bulb: not separated from translators.

Retinacula character: E ?

A drawing lacking details maybe worth 100 words whereas a photo would have been worth 1,000 words. No pellucid edge shown, no caudicle translator differentiation.

Hoya blashernaezii subsp. karencaseae Kloppenburg & Mendoza
(unpublished) GM #164



Two pictures of different pollinarium from the same flower. Here enlarged the same 110x. Note the differences in the retinacula, the round one is similar to the type species whereas the other (body) like is typical of my

species *H. siariae* later combined as a subspecies. The differences are why I placed the original species separately among some other differences. I have never seen this discrepancy in retinaculum before. Also the translators appear to be different.

Pollinium

length 0.35 mm
widest 0.23 mm

Translator/caudicle type: ls/o

Pollinia apex type: T

Retinaculum

length 0.12 mm
shoulder 0.15 mm
waist 0.09 mm
hip 0.10 mm
ext 0.10 mm
widest 0.02 mm

Translator

length 0.10 mm

Caudicle bulb: ?

Retinacula character: S

Caudicle bulb diam. 0.06 mm

***Hoya blashernaezii* subsp. *marizae* Kloppenburg & Mendoza**
(unpublished) GM #193



Pollinarium enlarged a little over 140x.

Pollinium

length 0.35 mm
widest 0.20 mm

Retinaculum

oval 0.15 x 0.10 mm

Translator

length 0.05 mm
widest 0.04 mm

Caudicle

bulb is oval 0.06 x 0.04 mm

Translator/caudicle type: difficult to classify but near ls/o or d/o

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: LH

Another photo of a different pollinium enlarged 120x. The retinacula are all alike oval in shape with translators and caudicles attached possibly inside but appear here lower left side to run down the outer edge and here the translator appears to be more delta shaped which would classify the structures as d/o. This retinacular type is the one found in *Hoya blashernaezii* but in only a few of the subspecies.



Hoya concava Kloppenburg, Siar, Cajano & Carandang 2014

CAHUP 5991

Photos 16 Nov. 2006



Pollinarium enlarged a little less than 165x.

Pollinium

length	0.35 mm
widest	0.13 mm

Retinaculum

length	0.14 mm
shoulder	0.12 mm
waist	0.04 mm
hip	0.06 mm
ext.	0.04 mm

Translators

length	0.08 mm
depth	0.02 mm

Caudicle

bulb diam.	0.04 mm
------------	---------

Ratio: r/p 1.9
p/w 2.7

Translator/caudicle type:

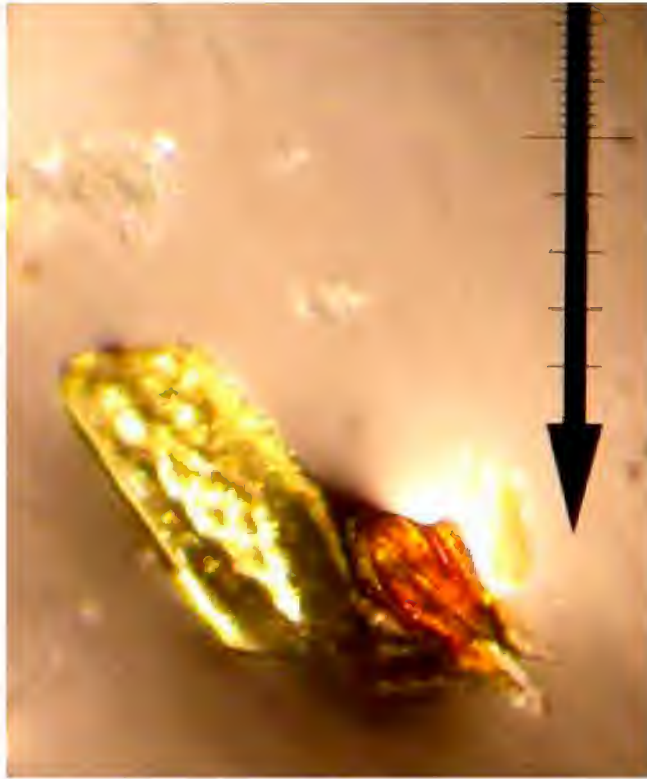
ls/o

Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: HU

Hoya carmelae Kloppenburg, Siar & Ferreras 2010



Pollinarium enlarged about 130x.

Pollinium

length	0.35 mm
widest	0.16 mm

Retinaculum

length	0.17 mm
shoulder	0.11 mm
waist	0.06 mm
hip	0.07 mm
ext.	0.06 mm

Translator

length	0.13 mm
depth	0.04 mm

Caudicle

bulb diam.	0.05 mm
------------	---------

Translator/caudicle type: ls/o

Pollinia apex type: F

Caudicle bulb: ?

Retinacula character: HE

Hoya eburna subsp. rosea Kloppenburg & Mendoza
(unpublished) GM #39



Pollinarium (picture above) enlarged ca. 130x.

Pollinium

length	0.35 mm
widest	0.15 mm

Retinaculum

length	0.08 mm
shoulder	0.10 mm

waist	0.06 mm
hip	0.08 mm
ext.	0.05 mm

Translator

length	0.08 mm
depth	0.03 mm

Caudicle

bulb diam.	0.04 mm
------------	---------

Translator/caudicle type. ls/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya ginabrigidana Kloppenburg & Mendoza
(unpublished) GM #18



Pollinarium
enlarged ca. 190x.

Pollinium

length 0.35mm
widest 0.14mm

Retinaculum

length 0.06mm
shoulder 0.09mm
waist 0.06mm
hip 0.07mm
ext. 0.05mm

Translator

length 0.09mm
depth 0.02mm

Caudicle

bulb 0.05mm

Translator/caudicle Type: ls/o

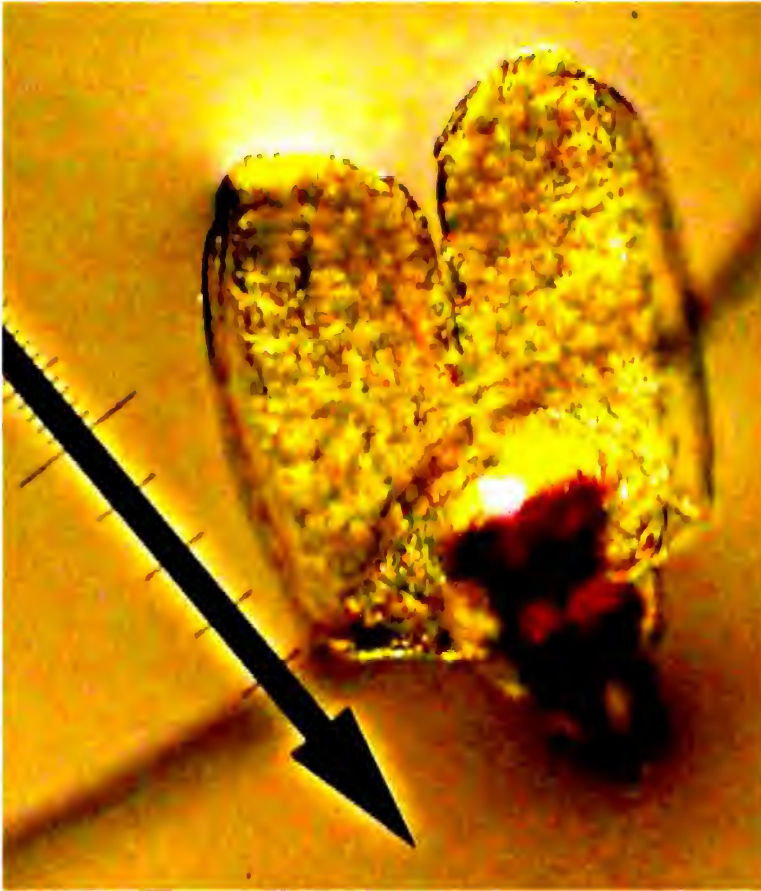
Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya foliapalmata Kloppenburg & Mendoza
(unpublished)

Pollinarium enlarged 190x.



Pollinium

length 0.35 mm
widest 0.17 mm

Retinaculum

length 0.13 mm
shoulder 0.11 mm
waist 0.06 mm
hip 0.10 mm
ext 0.05 mm

Translator

length 0.06 mm
wide 0.02 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:

ls/o

Pollinia apex type: R

Caudicles: G

Retinacula type: S or maybe HU

Hoya crassicaulis Elmer ex Kloppenburg 1995



Pollinarium from the above sheet. The reticule lines below the picture are 1/100 of a mm. between two longest lines is 1/10 of a mm.

Pollinia

length	0.34
widest	0.13

Retinacula

length	0.15
shoulder	0.08

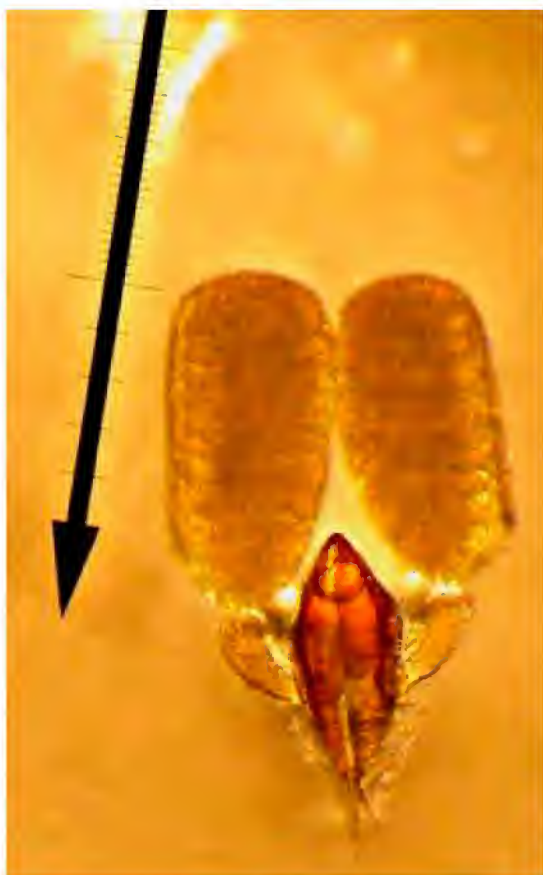
Translator/caudicle type: ls/o

Pollinium inner end type: T

Caudicle: C

Retinaculum: E

Hoya heuschkeliana subsp. mendozai Kloppenburg
(unpublished) GM #47



Pollinarium enlarged ca. 120x.

Pollinium

length	0.34 mm
widest	0.18 mm

Retinaculum

length	0.17 mm
widest	0.11 mm
ext.	0.15 mm

Translator

length	0.15 mm
widest	0.05 mm

Caudicle

bulb diam.	0.05 mm
------------	---------

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: HE

Hoya navicula Kloppenburg & Mendoza 2015

GM #71 Collected by George Mendoza et al at Catanduanes, Bicol, Philippines



Pollinarium enlarged ca. 180x, I had a difficult time trying to find pollinaria where the pollinium were attached to the caudicles. Only one among 15. Here a pollinium turned down at side of the retinaculum. Difficult to determine the translator/caudicle type but I would judge it is ls/o

Pollinium

length	0.34 mm
widest	0.15 mm

Retinaculum

length	0.17 mm
shoulder	0.11 mm
waist	0.08 mm
hip	0.09 mm
ext	0.08 mm

Caudicle

bulb diam.	0.05 mm
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Photo of two pollinia above enlarged ca. 50x

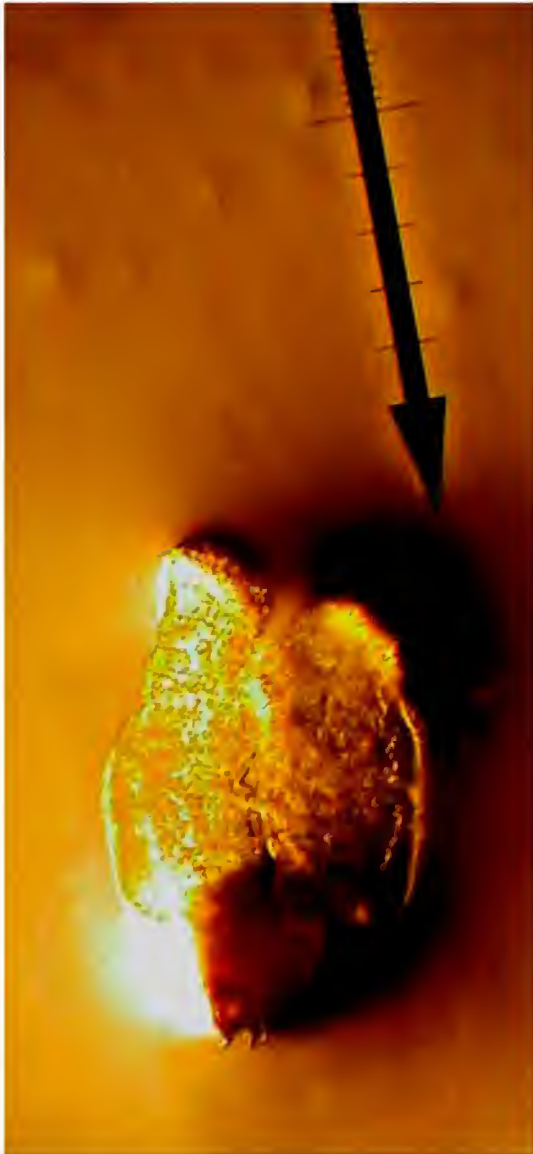
Pollinia apex type: RT

Translator/caudicle type: ls/o ?

Caudicle bulb: ?

Retinacula character: S

Hoya auroraensis Kloppenburg & Mendoza
(unpublished) GM #114



Pollinaria enlarged left ca. 124x; Right ca. 120x.

Pollinium

length	0.33 mm
widest	0.15 mm

Retinaculum

length	0.10 mm
shoulder	0.09 mm
waist	0.07 mm
hip	0.08 mm
ext.	0.03 mm

Translator

length	0.10 mm
wide	0.03 mm

Caudicle

bulb dial	0.06 mm
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Translator/caudicle type: ls/o possibly p/o

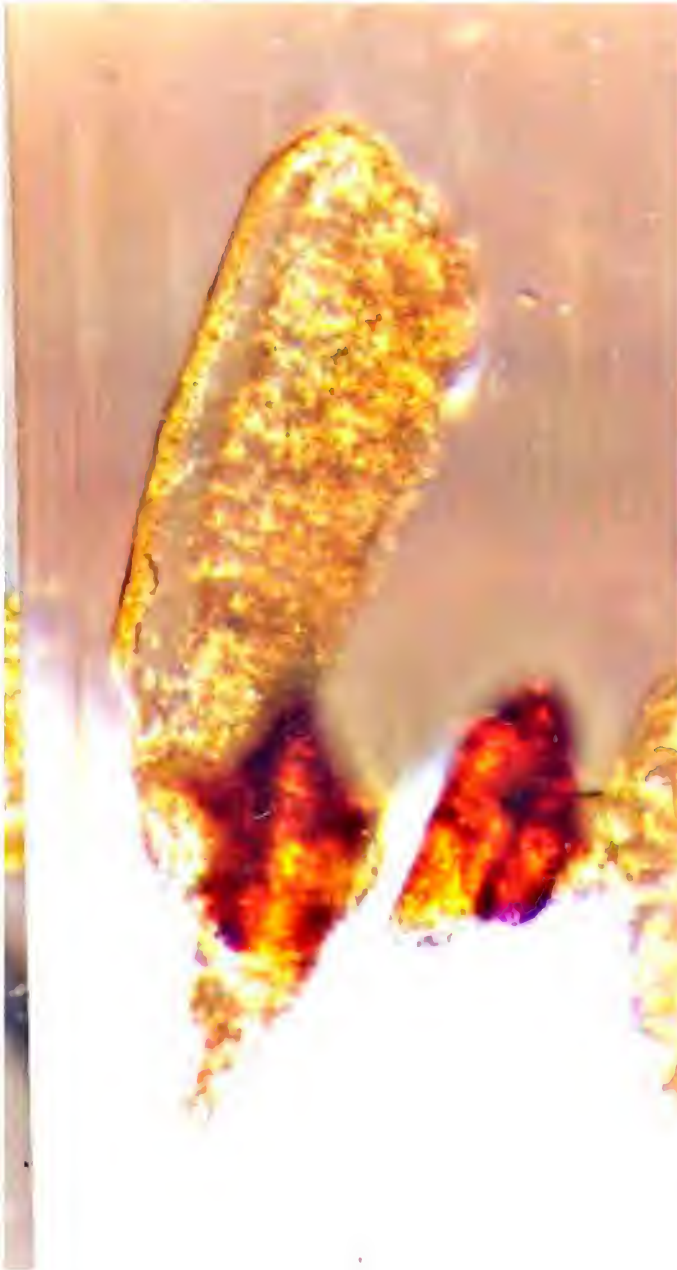
Pollinia apex type: RT

Caudicle bulb: ?

Hoya samarensis Kloppenburg & Siar 2012

Type clone

Collectors: PNH 7304 R. S. & G, Visayas 29 Oct. 1993. Western Samar. Mt. Malimngon.
Brg. Lokilokon, Peramas



Pollinarium enlarged about
165x.

Pollinium

length	0.33 mm
Widest	0.14 mm

Retinaculum

length	0.19 mm
shoulder	0.11 mm
Waist	0.07 mm
hip	0.09 mm
ext	0.04 mm

Translator

length	0.08 mm
depth	0.02 mm

Caudicle

bulb diam.	0.04 mm
------------	---------

Ratio: r/p 1.4
p/w 2.3

Translator/caudicle type: ls/o

Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: S

I had previously thought
this sp. might be *H. pentaphlebia*
but the leaf is wrong and the
pollinium too short among
differences.

Hoya coronarubra Kloppenburg & Mendoza
(unpublished) GM #117



Pollinarium enlarged ca,
150x.

Pollinarium

length 0.33 mm
widest 0.16 mm

Retinaculum

length 0.10 mm
shoulder 0.12 mm
waist 0.09 mm
hip 0.11 mm
ext. 0.09 mm

Translator

length 0.10 mm
wide 0.02 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle

Type: ls/o

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: S

Hoya diptera Seemann 1861

Pollinarium from flower via Ann Wayman.



Magnified approximately 165x.

Pollinium

length: 0.32 mm
widest: 0.16 mm

Retinaculum

length: 0.13 mm
shoulder: 0.06 mm
widest: 0.05 mm
hip: 0.07 mm
ext.: 0.04 mm

Translators

length: 0.14 mm
depth: 0.05 mm

Caudicle

bulb diam.: 0.09 mm

Translator/caudicle Type: ls/o

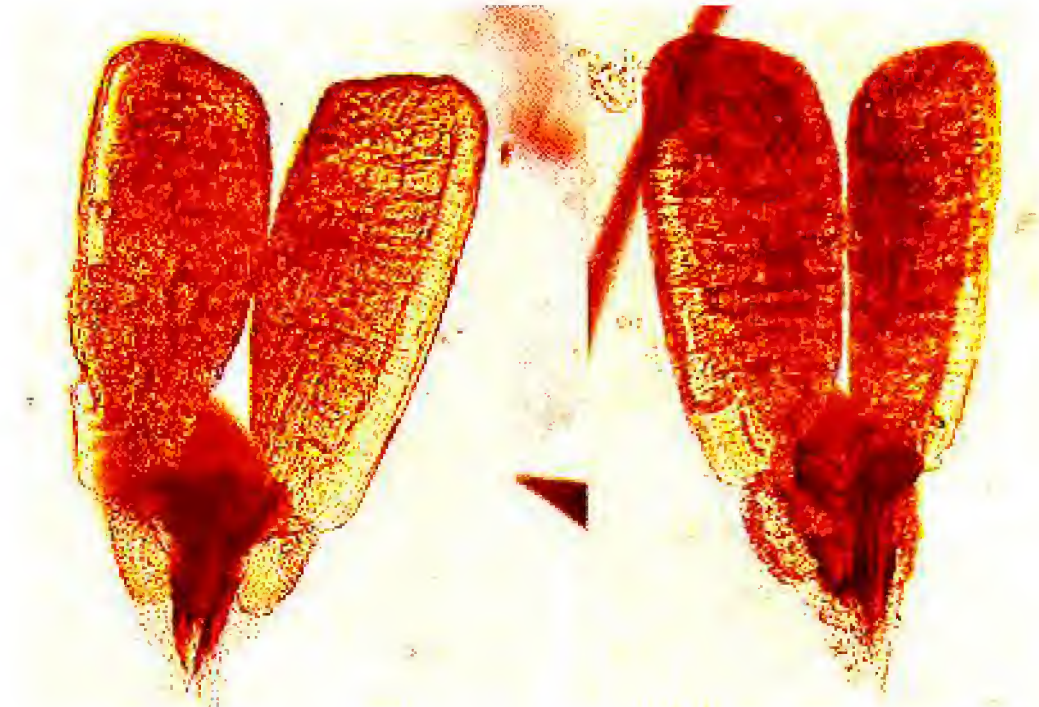
Pollinia inner apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya latifolia G. Don 1838

Flower from Ann Wayman Central Point, OR. Species not correct,
labeled *Hoya microphylla* alba.



The pollinarium at different focal lengths, enlarged about 165x in an attempt to show the "lobed" structure of the retinaculum. G. Don mentions a 3-lobed pollen-carrier. Here the shoulders of the retinaculum are broad, and even flared outward, the waist is narrow and there is again flaring at the hip area (most visible on the right hand photo).

Pollinia

length	0.32 mm
widest	0.15 mm

Retinaculum

length	0.16 mm
shoulder	0.10 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.05 mm

Translators

length	0.09 mm
depth	0.04 mm
wide	0.02 mm

Caudicle

bulb diam.	0.06 mm
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Translator/caudicle Type: ls/o

Caudicle bulb: G

Pollinia inner apex type: RF

Retinacula character: S

Hoya marquisii Kloppenburg & Mendoza
(unpublished) GM #63



Pollinarium enlarged ca. 220x, I could not get the retinaculum to lay flat even on 5 specimens, see the retinacula in the dorsal view of the corona below it has a long narrow head, narrow body with waist and then a hip area just above the spreading extensions.

Pollinium

length 0.32 mm
widest 0.15 mm

Retinaculum

length 0.22 mm
hip 0.14 mm

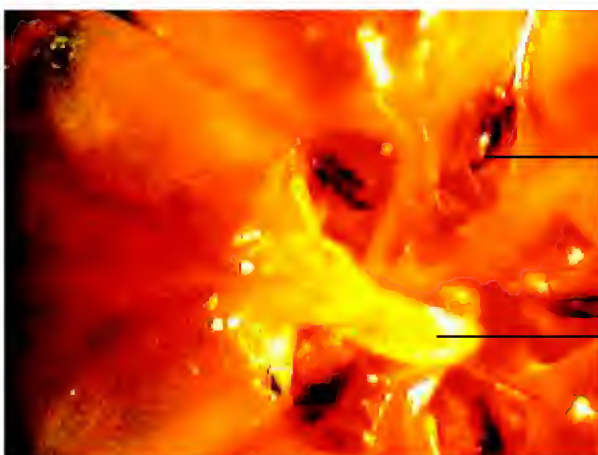
long inner area rounded
(see below)

Translator/caudicle type:
ls/o difficult to tell but
most likely correct.

Pollinia inner end type: T

Caudicle bulb: C

Rretinacula: S



Retinaculum
Head end inward and line at the hip area
where the translators are attached.
Inner corona lobe apex
narrow with a keeled dorsal.

Hoya heuschkeliana subsp. marionii Kloppenburg & Ferreras 2014
PUH #14647



Pollinarium enlarged ca. 200x

Pollinium

length 0.31 mm
widest 0.17 mm

Retinaculum

length 0.18 mm
shoulder 0.13 mm
waist 0.09 mm
hip 0.10 mm
ext. 0.09 mm

Translator

length 0.12 mm
depth 0.05 mm

Caudicle

bulb diam. 0.06 mm

Translator/caudicle type ls/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: R

Hoya sp. IML 850 affinis H. macgregorii

Collected by DMC, #1713

Grown and flowered in Fresno, CA.



bulb. diam.: ?

Magnified approximately 165x.

Pollinium

length: 0.31 mm
widest: 0.17 mm

Retinaculum

length: 0.18 mm
shoulder: 0.11 mm
waist: 0.08 mm
hip: 0.11 mm
ext.: ?

Translators

length: 0.09 mm
depth: 0.03 mm

Caudicle

Translator/caudicle type ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Retinacula character: S

Hoya camphorifolia Warburg 1904

Not the species:



Pollinarium enlarged about 165x.

Pollinia

length	0.31 mm
widest	0.15 mm

Retinaculum

length	0.08 mm
shoulder	0.08 mm
waist	0.03 mm
hip	0.04 mm
extensions	0.02 mm

Translator

length	0.05 mm
depth	0.01 mm

Caudicle

bulb. diam.	0.03 mm.
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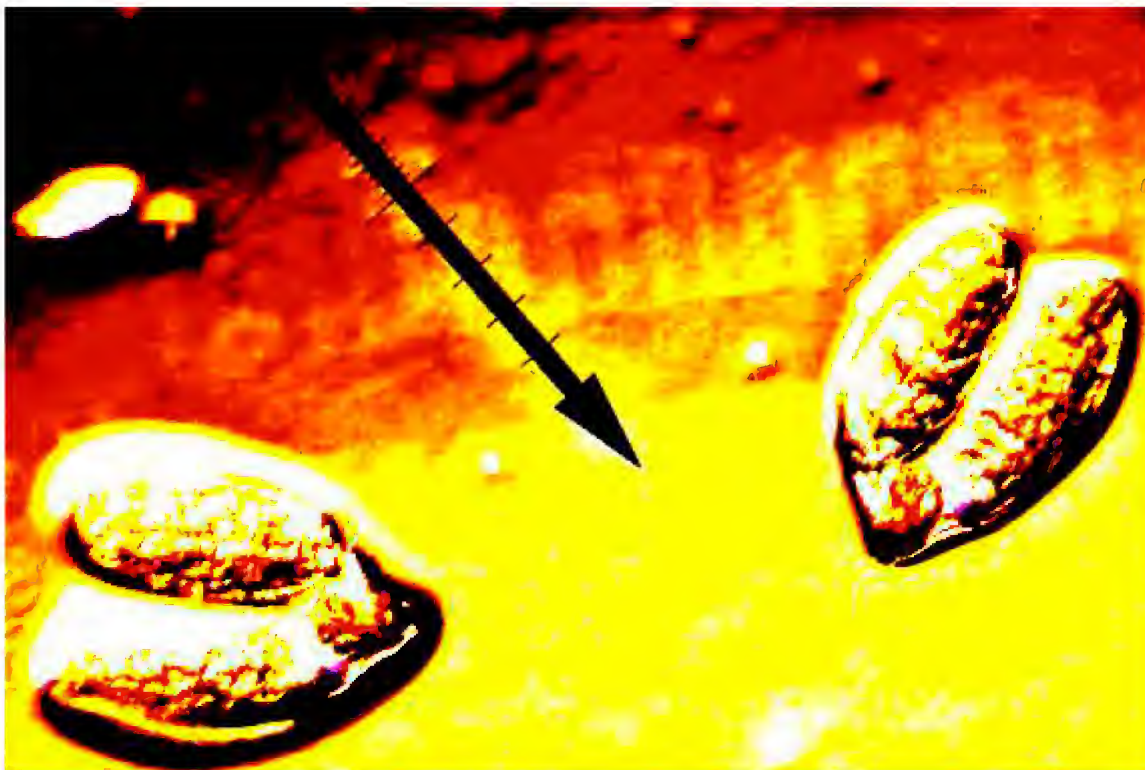
Translator/caudicle type ls/o

Pollinia inner end type: T

Caudicle bulb: ?

Retinacula character: HU ?

Hoya williamsiana subsp. calendulina Kloppenburg & Mendoza
(unpublished) GM #83



Pollinarium enlarged ca. 120x

Pollinium

length	0.30 mm
widest	0.11 mm

Retinaculum

length	0.10 mm
shoulder	0.07 mm
hip	0.04 mm
waist	0.05 mm
ext.	0.02 mm

Translator

length	0.09 mm
wide	0.02 mm

Translator/caudicle type: ls/o

Pollinia end type: R

Caudicle

bulb diam.	0.04 mm
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Caudicle bulb: G

Retinacula character: S

Hoya cyclaminea Kloppenburg & Mendoza
(unpublished) GM #9



Pollinarium
enlarged ca. 190x.

Pollinium

length 0.28 mm
widest 0.12 mm

Retinaculum

length 0.06 mm
ext. 0.04 mm

Translator

length 0.03 mm

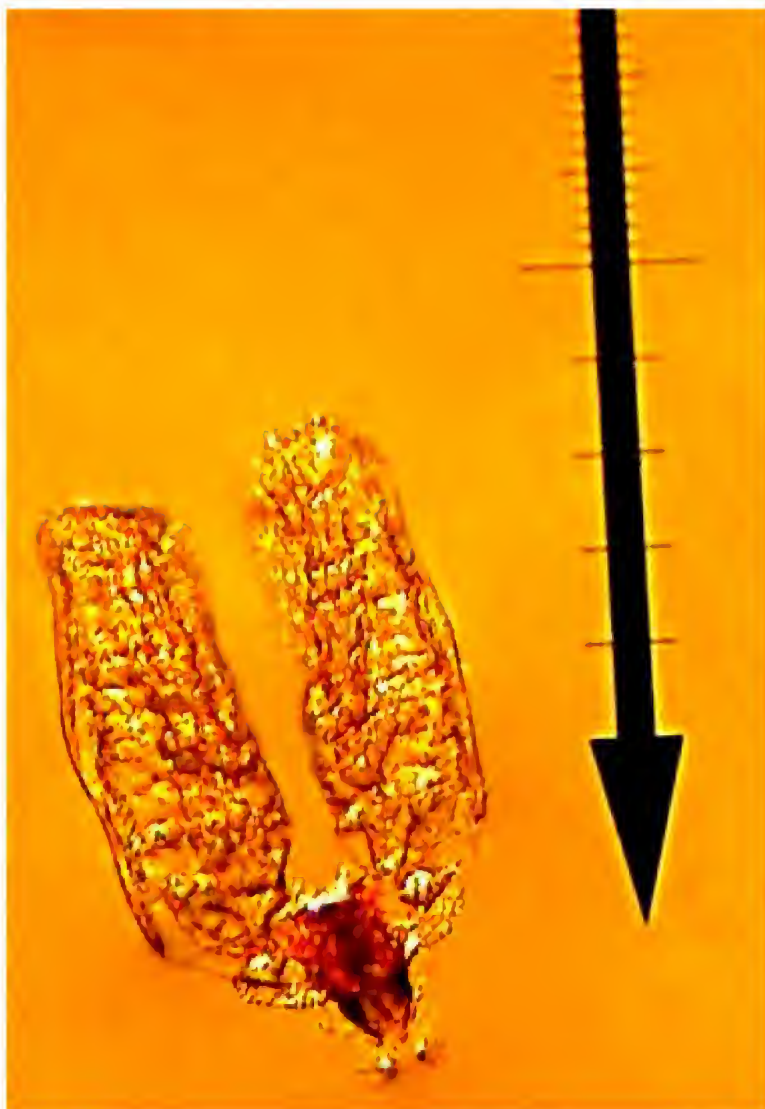
Caudicle

bulb 0.02 mm

Translator/caudicle type: ls/o Pollinia end type: R Caudicle bulb: G

Ratios: p/w 2.3 p/r 4.7 Retinacula character: S

Hoya viscayaensis Kloppenburg & Mendoza
(unpublished) GM #95



Pollinarium enlarged ca.
240x.

Pollinium

length 0.27 mm
widest 0.10 mm

Retinaculum

length 0.08 mm
shoulder 0.08 mm
waist 0.05 mm
hip 0.06 mm
ext 0.03 mm

Translator

length 0.05 mm
wide 0.02 mm

Caudicle

bulb diam. 0.04 mm

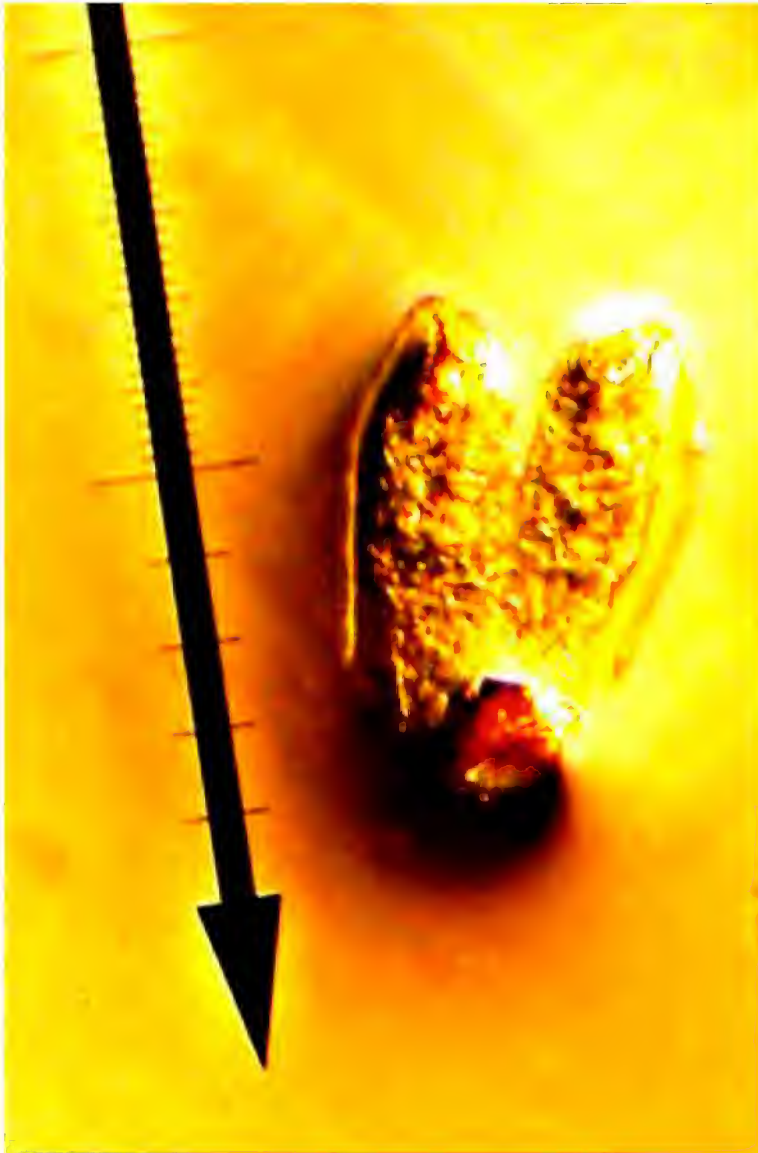
Translator/caudicle type:
ls/o

Pollinia end type: RF

Caudicle bulb: G

Retinacula character: HU

Hoya bakerensis Kloppenburg & Mendoza
(unpublished) GM #113



Pollinarium enlarged 210x.

Pollinium

length 0.26 mm
widest 0.10 mm

Retinaculum

length 0.10 mm
widest 0.08 mm

Translator

length 0.04 mm
wide 0.01 mm

Caudicle

bulb diam. 0.03 mm

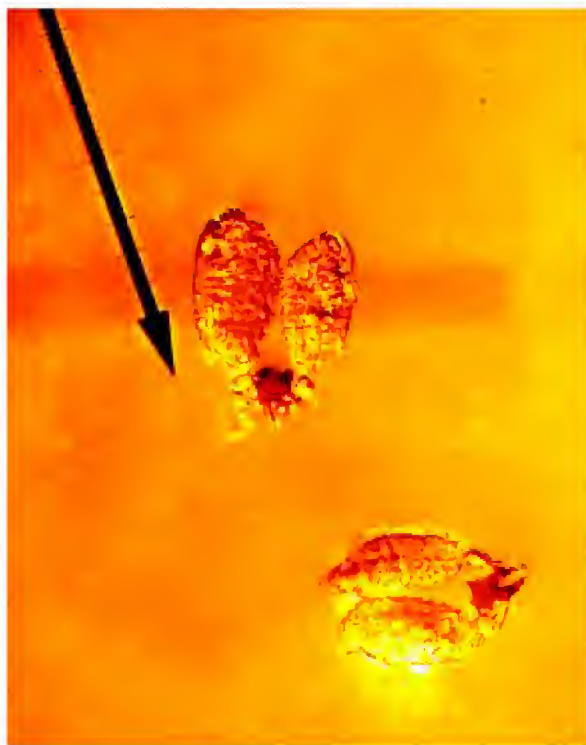
Translator/caudicle type:
ls/o

Difficult to delineate the retinaculum from this micro-photo may be turned on its axis, appears to be nearly round.

Pollinia inner apex type: F

Caudicle bulb: ?

Hoya marananiae Kloppenburg, Siar, Guevarra & Carandang 2015
Type clone



Two Pollinaria enlarged about 150x.

Pollinarium

length	0.25 mm
widest	0.13 mm

Retinaculum

length	0.05 mm
shoulder	0.06 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.06 mm

Translator

length	0.06 mm
depth	0.01 mm

Caudicle

bulb. diam.	0.03 mm
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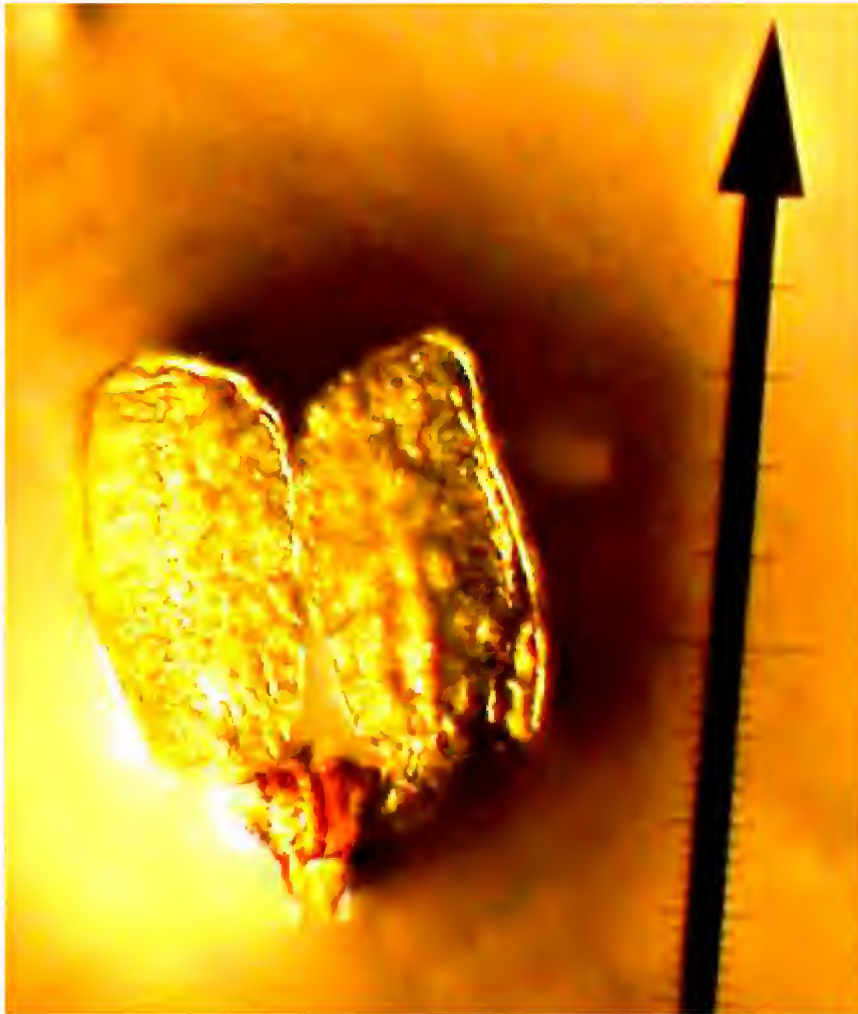
Translator /caudicle type: ls/o

Pollinia end type: R

Caudicle bulb: ?

Retinacula character: S nearly HU

Hoya nakarensis subsp. cadmia Kloppenburg & Mendoza
(unpublished) GM #111



Pollinarium
enlarged ca. 220x.

Pollinium

length 0.25 mm
widest 0.12 mm

Retinaculum

length 0.06 mm
shoulder 0.10 mm
waist 0.03 mm
hip 0.05 mm
ext. 0.03 mm

Translator

length 0.05 mm
wide 0.02 mm

Caudicle

bulb diam. 0.04 mm

Translator/caudicle type: ls/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S

Hoya lagyoensis Kloppenburg & Mendoza
(unpublished) GM #185



Pollinarium enlarges 180x.

Pollinium

length 0.25 mm
widest 0.10 mm

Retinaculum

length 0.06 mm
shoulder 0.08 mm
waist 0.05 mm
hip 0.06mm
extensions 0.04 mm

Translator

length 0.04 mm
widest 0.01 mm

Caudicle

bulb diam. 0.03 mm

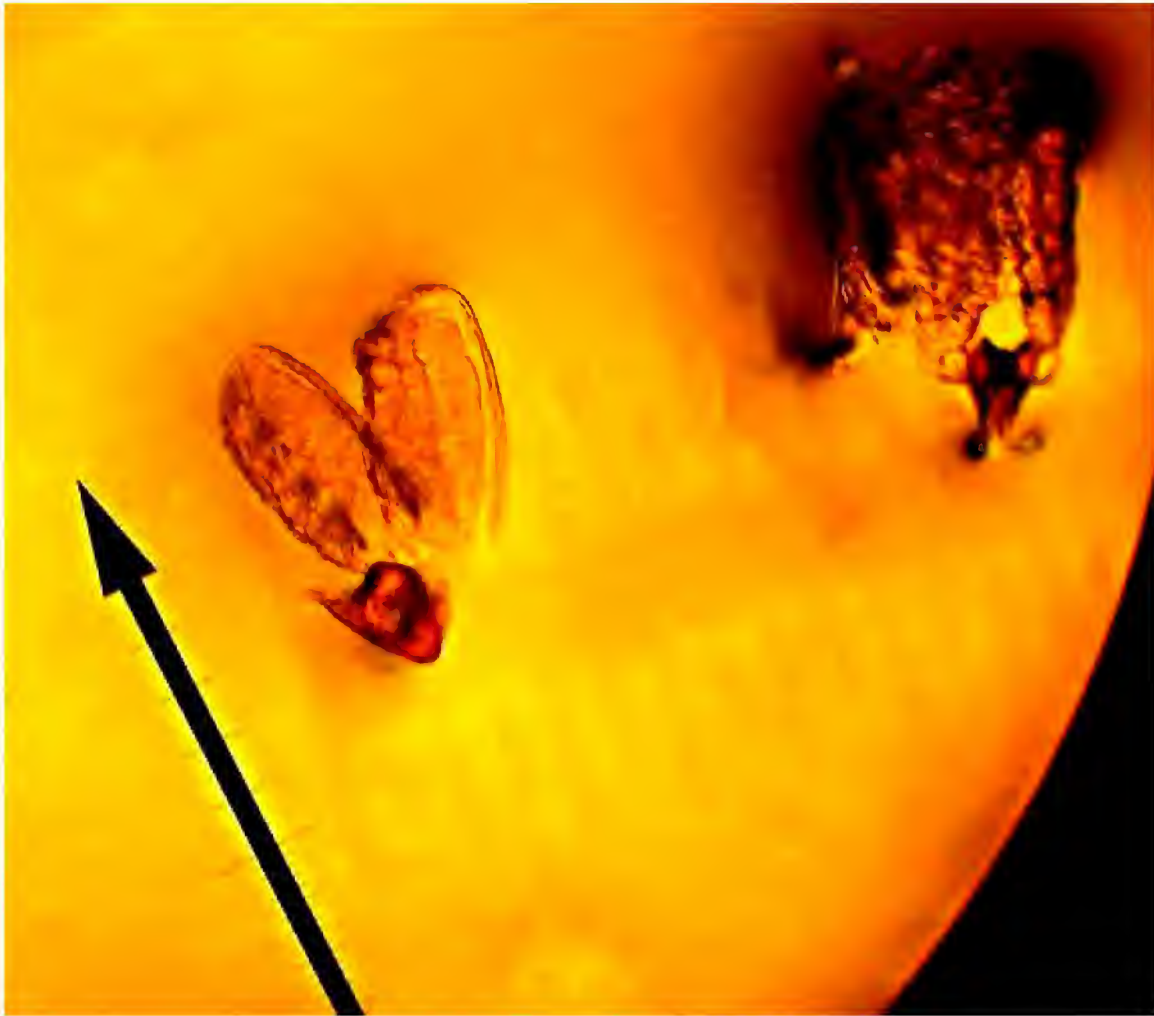
Translator/caudicle type: ls/o

Pollinia apex type: RT

Caudicle bulb: C

Retinacula character: S

Hoya martinii subsp. daraitonensis Kloppenburg & Mendoza
(unpublished) GM #184



Pollinarium enlarged 150x.

Pollinium

length	0.24 mm
widest	0.12 mm

Retinaculum

length	0.07 mm
shoulders	0.08 mm
waist	0.04 mm
ext.	0.05 mm
hip	0.05 mm

Translator

length	0.03 mm
widest	less than 0.01 mm

Caudicle

diam	0.03 mm
------	---------

Translator/caudicle type: ls/o

The retinaculum has unusual extensions (legs) that spread outward in a curve and appear to have slightly bulbous ends.

Pollinia apex type: RT

Retinacula type: HU

Caudicle bulb: G

Hoya martinii Kloppenburg & Mendoza
(unpublished) GM #4



Pollinarium enlarged ca.
230x.

Pollinium

length 0.24 mm
widest 0.10 mm

Retinaculum

length 0.07 mm
shoulder 0.05 mm
waist 0.04+ mm
hip 0.05 mm
ext. 0.03 mm

Translator

length 0.05 mm
depth 0.02 mm

Caudicle

bulb 0.02 mm

Translator/caudicle Type:
ls/o

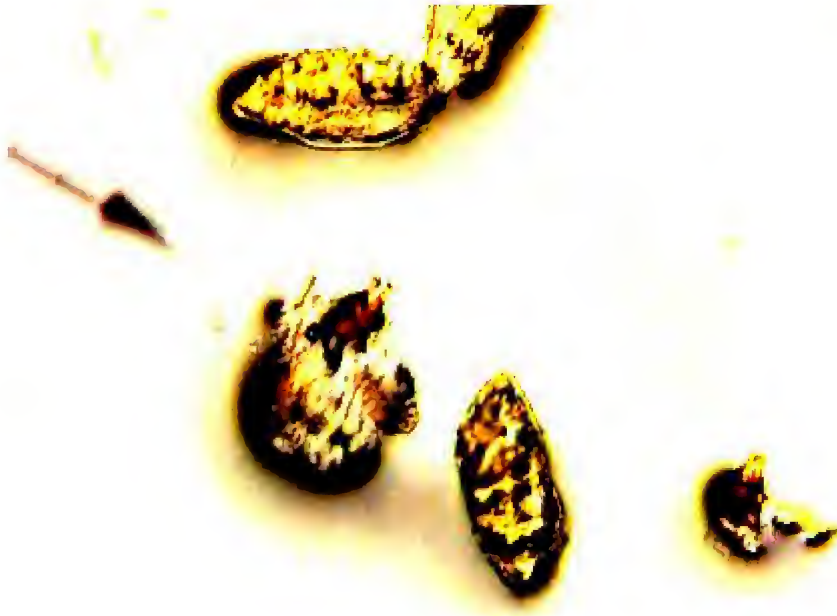
Pollinia end type: F

Caudicle bulb: C ?

Retinacula character: LS

Hoya sp. UC s.n. Taylor

Collected in 1923 at Catobato, Mindoro, Philippines. Roll 101 Album 10 draw #176. A
Section Acanthostemma (Bl.) Kloppenburg species.



A group of pollinia and two pollinarium enlarged about 80x Difficult to get any precise measurements:

Pollinium

length ca. 0.24 mm
widest ca, 0.10 mm

Retinaculum

length ca. 0.08 mm
shoulder ca 0.05 mm
waist a little narrower
hip as the shoulders.
ex. ca. 0.02 mm

Translator/caudicle type: ls/o

Pollinia inner end type: RT

Caudicle bulb: ?

Retinacula character: S

Hoya unruhiana Kloppenburg, Siar, Mendoza, Cajano, Guevarra &
Carandang 2013. ISSN 1055-4564 **Type** clone



Pollinium

length	0.24 mm
widest	0.11 mm

Retinaculum

length	0.09 mm
shoulder	0.07 mm
waist	0.04 mm
hip	0.05 mm
ext	0.02 mm

Translator

length	0.04 mm
--------	---------

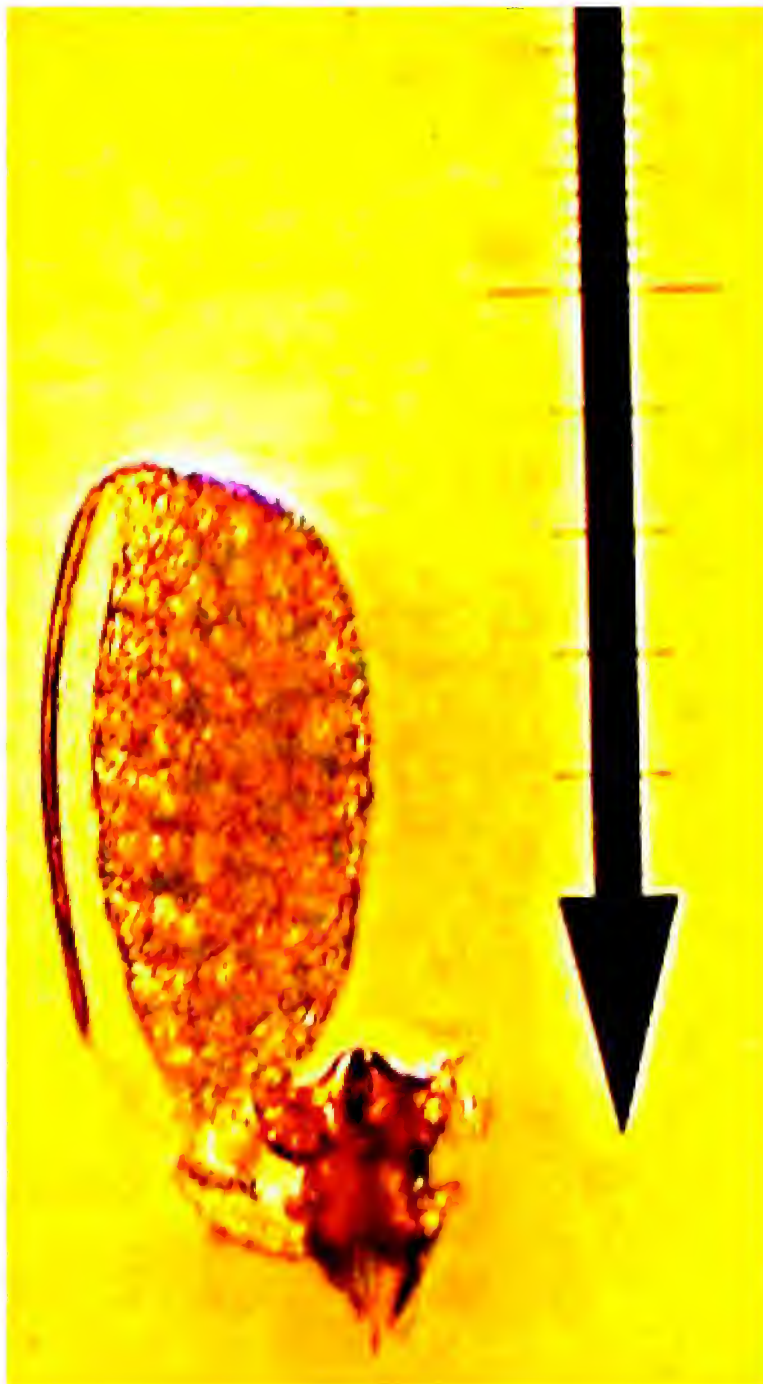
Caudicle bulb diam. 0.02 m

Retinacula type: S

Pollinia inner end: R

Translator/caudicle: ls/o

Hoya subrosea subsp. inawaensis Kloppenburg & Mendoza
(unpublished) GM #168



Pollinarium enlarge 200x.

Pollinium

length 0.23 mm
widest 0.14 mm

Retinaculum

length 0.08 mm
shoulder 0.12 mm
waist 0.05 mm
hip 0.08 mm
ext. 0.004 mm

Translator

length 0.07 mm
widest 0.02 mm

Caudicle

bulb diam. 0.04 mm

Translator/caudicle Type:
ls/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: HU

Pollinia Types 2017-1D
ls/o (cont.)

- 242. **Hoya bifunda** Klopp., Siar, Cajano, Guevarra & Carandang 2013
- 243. **Hoya cupa** Kloppenburg & Mendoza
- 244. **Hoya capotoanensis** Kloppenburg 2015
- 245. **Hoya capotoanensis subsp. quezonensis** Kloppenburg & Mendoza
- 246. **Hoya carandangiana** Kloppenburg & Siar 2015
- 247. **Hoya minuta** Kloppenburg & Mendoza
- 248. **Hoya minipollinia** Kloppenburg & Cajano
- 249. **Hoya parvapollinia** Kloppenburg & Mendoza

Hoya bifunda Kloppenburg, Siar, Cajano, Guevarra & Carandang
2013

Pollinarium enlarged ca. 290x



Pollinium

length 0.23 mm
widest 0.10 mm

Retinaculum

length 0.06 mm
shoulder 0.06 mm
waist 0.04 mm
hip 0.05 mm
ext. 0.03 mm

Translator

length 0.06 mm
depth 0.02 mm

Caudicle

bulb 0.02 mm

Type: C

Translator/caudicle type: ls/o

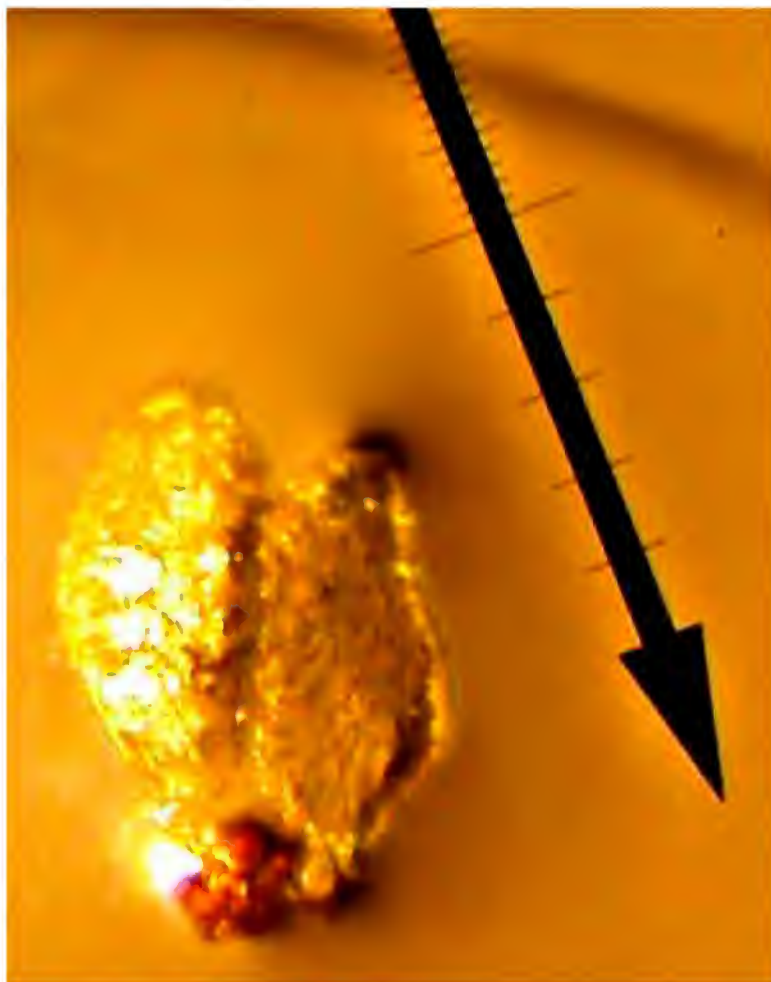
Pollinia inner end type: R

Ratios: p/w 2.3

p/r 3.8

Retinacula character: HU

Hoya cupa Kloppenburg & Mendoza
(unpublished) GM #94



Pollinarium
enlarged ca. 240x.

Pollinium

length	0.23 mm
widest	0.12 mm

Retinaculum

length	0.06 mm
shoulder	0.06 mm
waist	0.05 mm
hip	0.06 mm
ext.	0.01 mm

Translator

length	0.04 mm
wide	0.03 mm

Caudicle

bulb diam.	0.03 mm
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Translator/caudicle type:
ls/o

Pollinia end type: RT

Caudicle bulb: C ?

Retinacula character: S ?

Hoya capotoanensis Kloppenburg 2015
Edano (PNH) 15642, 1952, Mt. Capotoan, Samar, Philippines.
ISSN 10055-4564



Pollinarium enlarged about 80x

Pollinium

length	0.22 mm
widest	0.05 mm

Retinaculum

length	0.15 mm
shoulder	0.10 mm
waist	0.06 mm
hip	0.08 mm
ext	0.03 mm.

Translators

length	0.07 mm ca.
--------	-------------

Translator/caudicle type: ls/o

Pollinia end type: R

Caudicle bulb: ?

Retinacula character: S

Hoya capotoanensis subsp. quezonensis Kloppenburg & Mendoza
(unpublished)
GM #207



Pollinarium enlarged ca.
180x.

Pollinium

length	0.22 mm
widest	0.12 mm

Translator/caudicle type: ls/o

Retinaculum

length	0.07 mm
shoulder	0.08 mm
waist	0.06 mm
hip	0.07 mm
ext.	0.03 mm

Pollinia inner end type: R

Retinacula: HU “hands up”

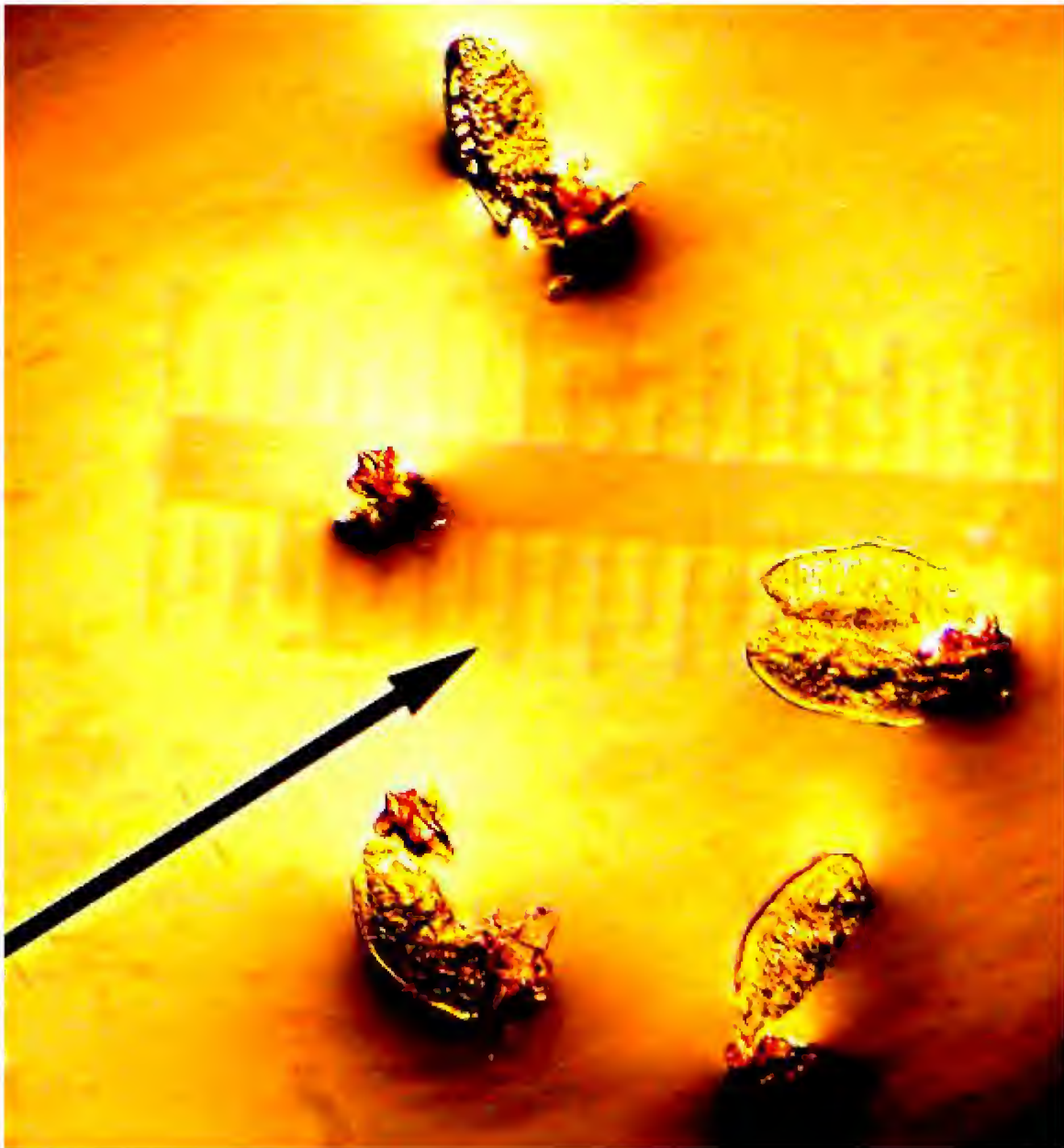
Translator

length	0.04 mm
widest	0.02 mm

Caudicle type: C

Caudicle

bulb diam.	0.03 mm
------------	---------



Pollinaria enlarged about 190x These are extremely small Pollinia. They were difficult to extract, very loose in positions, the vacuole (clear) area in from pellucid edge is relatively wide, pellucid edge extends to the inner apex.

Pollinium

length	0.21 mm
widest	0.09 mm

Retinaculum

length	0.07 mm
shoulder	0.09 mm
waist	0.06 mm
hip	0.07 mm

Translator

length	0.05 mm	ext.	0.01 mm
depth	0.01 mm		
Ratio:	pol./ wide 2.3	Pol./ret.	2.6
		Caudicle	
		bulb diam.	0.03 mm

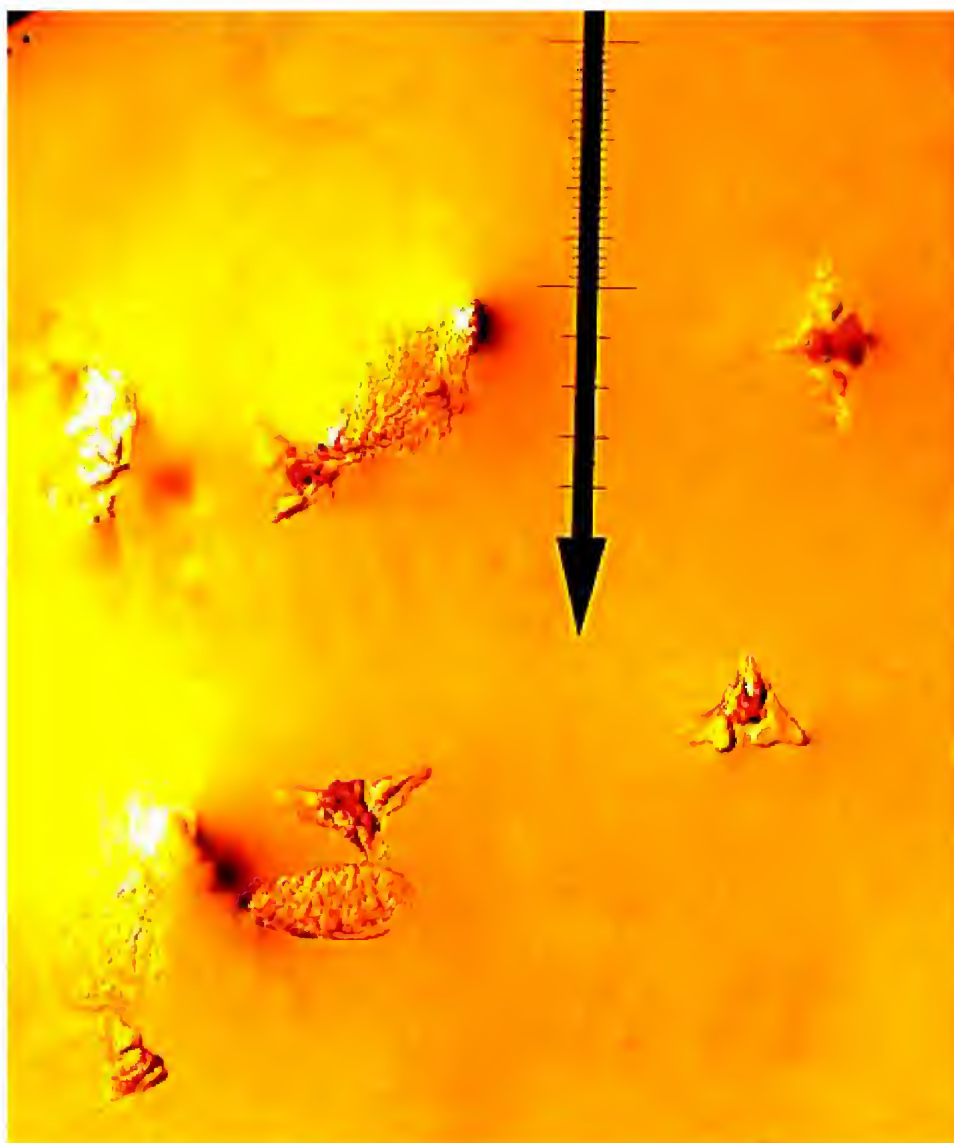
Translator/caudicle type: ls/o.

Pollinia inner apex type: RT

Caudicle bulb: C ?

Retinacula character: S

Hoya minuta Kloppenburg & Mendoza
(unpublished) GM #41



Pollinaria above enlarged ca. 130x.

Translator/caudicle Type: ls/o

Pollinia end type: R

Retinacula character: S

Pollinarium		Retinaculum	
length	0.19 mm	length	0.06 mm
widest	0.08 mm	shoulder	0.06 mm
		waist	0.03 mm
		hip	0.04 mm
		ext.	0.03 mm
Translator		Caudicle bulb	
length	0.08 mm	Clear ?	
widest	0.03 mm	cw	0.05 x 0.03

Hoya minipollinia Kloppenburg & Cajano

sp. AC #003
(unpublished)



Pollinarium enlarged
160x.

Pollinium

length	0.15 mm
widest	0.11 mm

Retinaculum

length	0.07 mm
shoulder	0.09 mm
hip	0.07 mm
ext.	0.03 mm

Translator

length	0.08 mm
widest	0.03 mm



Translator/caudicle type: ls/o most likely.

Pollinia end: T

Caudicle bulb: ?

Retinacula character: S

Retinaculum enlarged 230x to show more details, although still not very sharp! Most likely the caudicles are oval shaped so the translator/caudicle type will be “ls/o” and the pollinia ends are tapered “T”

Hoya parvapollinia Kloppenburg & Mendoza
(unpublished) GM # GM #46



Pollinarium enlarged ca. 230x. Here the right pollinium is turned inward on its axis, and the retinacula is also turned so the head is turned outward (reversed). This is a small pollinarium.

Pollinium

length 0.12 mm
widest 0.10 mm

Retinaculum

length 0.08 mm
shoulder 0.07 mm
waist 0.05 mm
hip 0.06 mm
ext. 0.03 mm

Translators

length 0.05 mm
depth 0.01 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle Type: ls/o

Pollinia end type: T

Caudicle bulb: G ?

Retinacula character: S

Pollinia Types 2017

fb/cw or l/cw or fb/o

1. **Hoya imbricata subsp. megapollinia** Kloppenburg 2014
2. **Hoya apoensis var. sagittaria** Kloppenburg, Siar & Ferreras 2010
3. **Hoya imbricata forma basisubcordata** Koorders
4. **Hoya fraterna** Blume 1849
5. **Hoya linavergarae** Kloppenburg & Siar 2006 (unpublished)
6. **Hoya bella** Hooker 1848
7. **Hoya weebella** Kloppenburg 2005
8. **Hoya sp. MT 13**
9. **Hoya acicularis** Green 2002
10. **Hoya darwinii subsp. minora** Kloppenburg & Mendoza
11. **Hoya sp. UPLB 50**
12. **Hoya imbricata** Decaisne 1844
13. **Hoya imbricata subsp. lagunaensis** Kloppenburg & Mendoza
14. **Hoya kloppenburgii** Green 2001
15. **Hoya campanulata** Blume 1826
16. **Hoya imbricata subsp. sulawesiensis** (unpublished)
17. **Hoya caudata** Hooker f. 1883
18. **Hoya benitotanii** Kloppenburg & Siar 2010
19. **Hoya loheri** Kloppenburg 1991
20. **Hoya lucyae** Kloppenburg & Siar 2006
21. **Hoya sp. IML 557**
22. **Hoya edwinofernandoi** Kloppenburg, Cajano & Hadsall 2015
23. **Hoya anncajanoae** Kloppenburg & Siar 2008
24. **Hoya lanceolata** Wallich ex Don 1825
25. **Hoya cystiantha** Schlechter 1913
26. **Hoya wayetii** Kloppenburg 1993
27. **Hoya linearis** Wallich 1825
28. **Hoya maxima** (Karst.) Warburg 1907
29. **Hoya merrillii** Schlechter 1904
30. **Hoya bicknellii** Kloppenburg 1999
31. **Hoya chiekoae** Kloppenburg, Ferreras & Mendoza 2012
32. **Hoya kentiana** Burton 1991
33. **Hoya rosarioae** Kloppenburg & Siar 2015
34. **Hoya sp. NS-0009**
35. **Hoya micrantha** Hooker f. 1883
36. **Hoya rizaliana** Kloppenburg 1991
37. **Hoya burtoniae** Kloppenburg 1990
38. **Hoya rhodostella** Ridley 1923
39. **Hoya anncajanoae subsp. lagyoensis** Kloppenburg & Mendoza
40. **Hoya kanlaonensis** Kloppenburg, Siar & Ferreras 2010
41. **Hoya myrmecopa** Kleijn and Donkelaar 1999

42. **Hoya sp.** NS00-004
43. **Hoya obscura** Elmer ex Burton 1986
44. **Hoya sp.** Edano/Gutierrez (PNH) 37800 1957
45. **Hoya affina** Kloppenburg & Mendoza
46. **Hoya sp.** PNH 4936 Gaerlan & Fuentes
47. **Hoya scortechinii** King & Gamble 1908
48. **Hoya wayetii subsp. lagyoensis** Kloppenburg & Mendoza
49. **Hoya litoralis** Schlechter 1905
50. **Hoya nummularioides** Constantin 1912
51. **Hoya panayensis** Kloppenburg & Siar 2009
52. **Hoya lacunosa** Blume 1826
53. **Hoya breviaolata** Kleijn & Donkelaar 2001
54. **Hoya santafeensis** Kloppenburg & Mendoza 2015
55. **Hoya rima** Kloppenburg, Mendoza & Ferreras 2014
56. **Hoya sp.** UC 424
57. **Hoya sipitangensis** Kloppenburg & Wiberg 2002
58. **Hoya burtoniae** Kloppenburg 1990
59. **Hoya poolei** White & Francis 1928
60. **Hoya lacunosa** Blume 1826
61. **Hoya geotropia** Kloppenburg & Mendoza
62. **Hoya apoensis** subsp. *sagittaria* Kloppenburg, Siar & Ferreras 2010
63. **Hoya mitisa** Kloppenburg & Mendoza
64. **Hoya eitapensis** Schlechter 1909
65. **Hoya pseudolittoralis** Norman 1937
66. **Hoya pseudoleytenis subsp. majora** Kloppenburg & Mendoza
67. **Hoya davidcummingii** Kloppenburg 1995
68. **Hoya corazoniae** Kloppenburg, Siar & Ferreras 2010
69. **Hoya setsukokobayashiae** Kloppenburg & Mendoza
70. **Hoya tsangii** Burton 1988
71. **Hoya krohniana** Kloppenburg & Siar 2009
72. **Hoya nummularioides** Costantin 1912
73. **Hoya krohniana subsp. lalawinanensis** Kloppenburg & Mendoza
74. **Hoya apoensis** Kloppenburg & Siar 2010
75. **Hoya odetteae** Kloppenburg 1998
76. **Hoya taywanisensis** Kloppenburg & Mendoza
77. **Hoya pseudoleytenis** Kloppenburg, Mendoza, Guevarra & Carandang 2013
78. **Hoya acanthocitrina** Kloppenburg & Mendoza
79. **Hoya capatata** Kloppenburg & Mendoza
80. **Hoya biespada** Kloppenburg & Mendoza 2015
81. **Hoya sp.** Lisa V2
82. **Hoya realensis** Kloppenburg & Mendoza

Hoya imbricata subsp. megapollinia Kloppenburg 2014
sp. CAHUP 8359 (41559)



Pollinarium with one
pollinium missing
enlarged about 165x.

Pollinium

length 1.09 mm
widest 0.16 mm

Retinacula

length 0.36 mm
should. 0.10 mm
waist 0.05 mm
hip 0.10 mm
ext. 0.04 mm

Translators

length 0.32 mm
depth 0.06 mm

Caudicle

bulb diam. 0.08 mm

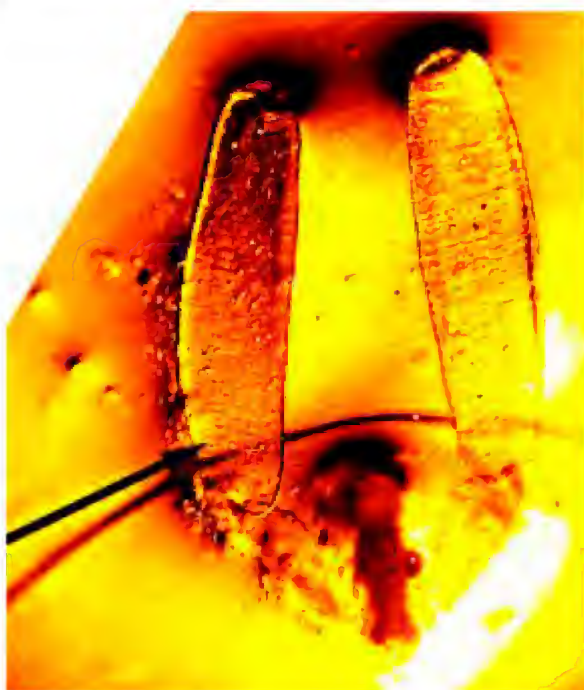
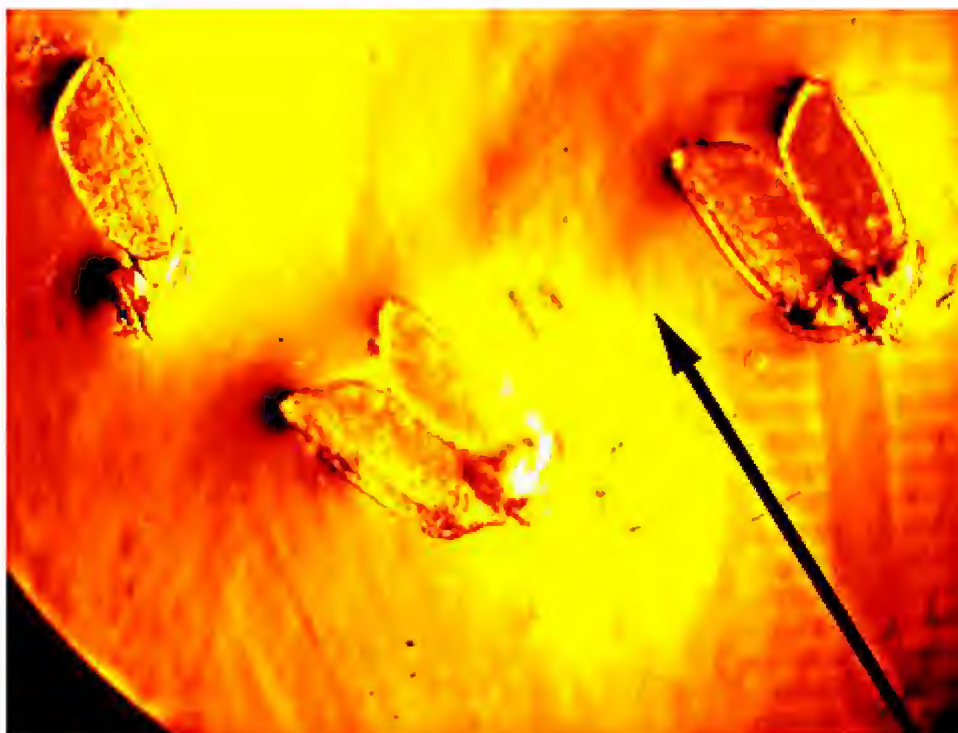
Translator/caudicle
type: fb/cw

Pollinia inner end
type: R

Retinacula character: E

Ratio: r/p 4.2
p/w 6.8

Hoya apoensis var. sagittaria Kloppenburg, Siar & Ferreras
2010 Type clone



Pollinium		
length		0.95 mm
widest		0.23 mm

Retinaculum		
length		0.40 mm
shoulder		0.15 mm
waist		0.10 mm
hip		0.12 mm
ext.		0.04 mm

Translator		
length		0.40 mm
depth		0.04 mm

Caudicle	bulb diam.	0.09	mm
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Translator/caudicle type: fb/cw
Caudicle bulb: granulate

Pollinia inner end type: R
Retinacula character: E

Hoya imbricata Decaisne 1844

Flower from **forma basisubcordata** Koorders via Maximo Wayet
Baguio, Luzon, Philippines. **Published 2014**



Pollinium

length: 0.93 mm

widest: 0.25 mm

Retinaculum

length: 0.22 mm

shoulder: 0.18 mm

waist: 0.06 mm

hip: 0.13 mm

ext.: 0.050mm

Translators

length: 0.19 mm

depth: 0.09 mm

Caudicle

bulb diam.: 0.11 mm

Translator/caudicle type: fb/cw

Pollinia inner end type: RT

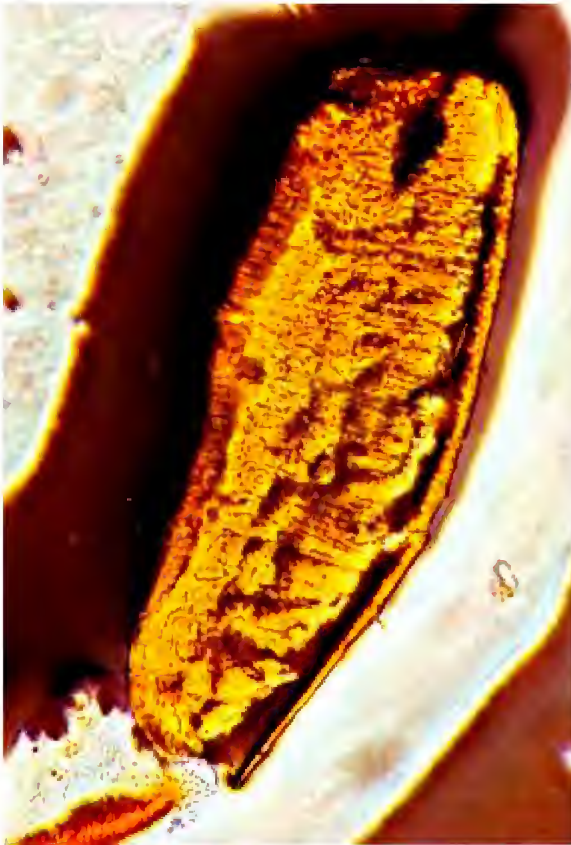
Retinacula type: E

Magnified approximately 65x.

Hoya fraterna Blume 1849



This is a large pollinarium, here enlarged about 32x. Translator arms are narrow and long attached well down on the retinaculum., actually they seem to run down the side of the retinaculum below the waist to the extensions. Caudicles are club shaped with the wide end near the pollinia base.



View of the pollinia and attachment to the caudicle enlarged about 165x.

Pollinia

length	0.79 mm
widest	0.23 mm

Retinaculum

length	0.35 mm
shoulder	0.14 mm
waist	no differences
hips	no differences
extensions	0.03 mm

Translator

length	0.03 mm
depth	0.02 mm

Caudicle

top	0.15 mm wide
length	0.21 mm without tail.



Translator/caudicle type: l/cw

Pollinia end type: R

Caudicle bulb: G

Retinacula character: HE

Another view showing the translator and caudicle etc. enlarged about ½ the size of the above. Here you can see how the thin translator seems to run down the side to the extensions.

Hoya linavergarae Kloppenburg & Siar 2006
(unpublished)



Pollinarium enlarged about 100x. Lower portion of the pollinium at the pelucid edge is expanded as in *Hoya australis*.

Pollinium

length	0.77 mm
widest	0.32 mm

Retinaculum

length	0.25 mm
shoulders	0.12 mm
waist	0.08 mm
hip	0.12 mm
ext.	0.02-0.06

mm material not fully differentiated

Translators

length	0.19 mm
depth	0.02 mm

Caudicle

bulb diam.	0.08 mm
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Ret.: poll ratio 1:2.6

Translator/caudicle type: l/cw

Pollinia end type: R

Retinacula character: HE

Hoya bella Hooker 1848

Plant from San Francisco Flower Mart via David Jones



Photomicrograph of the Pollinarium enlarged approx. 65x. I believe the pollinia are slightly shriveled do to dehydration.

The retinaculum is long and narrow. The clear caudicles are very large and somewhat indented at the top at least on the left side. The translator arms are also rather long and narrow attached well down on the retinaculum.

Pollinarium:

Pollinium

length	0.77 mm
widest	0.22 mm

Retinaculum

length	0.28 mm
shoulder	0.08 mm
waist	0.06 mm
hips	0.09 mm
extensions	0.04 mm

Translators

length	0.28 mm
depth	0.05 mm

Caudicles

diameter	0.10 mm
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Translator/caudicle type: fb/cw

Pollinia end type: T

Caudicle bulb: G

Retinacula character: E

Hoya weebella Kloppenburg 2005

Plant and flower from Chanin Thorut, Bangkok, Thailand. **Type** clone

Species was thought to be *Hoya vaccinioides* Hooker 1883.



Pollinarium:

Pollinia

length 0.77 mm
widest 0.25 mm at the
widest.

Retinaculum

length 0.25 mm

Translator

length 0.27mm
depth 0.06 mm

Caudicle

bulb diam. 0.14 mm but
also big on the tail ca. 0.18
mm wide.

Translator/caudicle type:
fb/cw

Pollinia end type: R

Caudicle bulb: G

Retinacula character: E

This pollinarium is enlarged about 165x in order to show more detail of the translators and caudicles. Note too that a pollen cell has germinated and a rather large pollen tube has emerged through the vacuole and under the split edge of the pellucid margin. As the pollinia absorbs moisture (honeydew) namely from a small orifice at the base of the pellucid margin the pollen grains swell, splitting the edge away along the pellucid margin allowing the pollen tubes to emerge. In this picture you can see the wedge shape of the translator with its wider concave top (here a darker linear structure) supporting the elongated caudicle. Here the caudicle, which in most cases is clear, has some granular structure to it but not nearly as much as the translator has.

Hoya sp. MT. 13

via May Tolentino, Manila, Philippines. 5 flowers in Solution from Torill Nyhuus
3/20/07



Pollinarium enlarged
about 165X.

Pollinium

length	0.76 mm
widest	0.27 mm

Retinaculum

length	0.30 mm
shoulder	0.12 mm
waist	0.10 mm
hip	0.11 mm
ext.	0.01 mm

Translators

length	0.22 mm
depth	0.03 mm

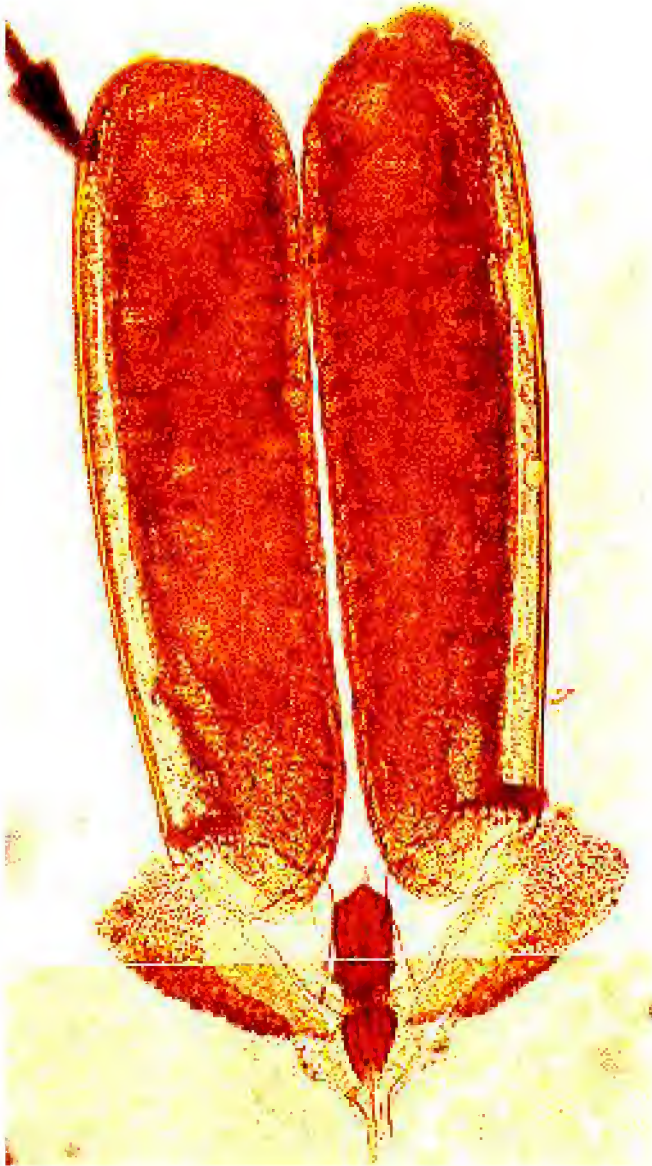
Caudicle

bulb diam.	0.16 mm
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Hoya acicularis Green 2002

sp. terete leafed from Danum Valley, Sabah Borneo

Type clone



Pollinarium: Unique!

Pollinia 0.74 mm long; nearly uniform in width 0.19 mm bottom and top rounded evenly. Pellucid edge clean and distinct. vacuole clear widest at base.

Translators 0.22 mm long, clavate shaped extends well beyond the edge of the pollinia, widest at outer apex 0.9 mm wide; attached well down near the hip of the retinaculum.

Caudicles clear, vortex shaped, pollinia in funnel end, top 0.07 mm wide; 0.09 mm long to a point near rectinacular attachment. Bulb ca. 0.15 mm in diameter.

Retinaculum 0.15 mm long including extensions, head rounded with slight shoulder there 0.05 mm wide, waist ca. 0.03 mm wide; hips 0.05 mm extensions about 0.02 mm wide. Center grooved.

Translator/caudicle type: fb/cw

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: E

Hoya imbricata subsp. sulawesiensis

Not published



Pollinarium form the Sulawesi Green form enlarged about 165x.

Pollinium

length	0.48 mm
widest	0.16 mm

Retinaculum

length	0.19 mm
shoulder	0.08 mm
waist	0.05 mm
hip	0.09 mm
ext.	0.07 mm

Translator

length	0.26 mm
depth	0.06 mm

Caudicle

bulb diam.	0.08 mm
------------	---------

This clone has an entirely larger pollinarium in most respects, see the data on the mottled leaf form above, from Palawan, Philippines.

Translator/caudicle type: lb/cw

Pollinia inner end: T

Retinacula type: E

Hoya darwinii subsp. minora Kloppenburg & Mendoza
(unpublished) GM #110



A rare caudicle type here is the stippled surface looks like a snake skin.

The pellucid edge is short difficult to see clearly here. One thing I noticed is the slight indentation in the retinacular head.

Pollinarium above enlarged ca. 90x, below a second picture focused to show the spade like rectinacular extensions.

Pollinia apex type: R

Retinacula character: R



Pollinium

length 0.72 mm
widest 0.43 mm

Retinaculum

length 0.77 mm
widest 0.65 mm
narrowest 0.29 mm
extensions 0.38 cm

Translator

length 0.63 mm
widest 0.10 mm

Caudicle

bulb top 0.32 mm
granular G

Translator/caudicle type: l/cw

Hoya sp. UPLB 50

Flowers in solution from Torill Nyhuus March 2007. Data 15 April 2007



Pollinarium enlarged about 165x.

Pollinium

length 0.70 mm

widest 0.26 mm

Retinaculum

length 0.29 mm

shold. 0.11 mm

waist 0.05 mm

hip 0.09 mm

ext. 0.03 mm

Translators

length 0.25 mm

depth 0.01 mm

Caudicle is bell shaped with surface texture.

diam. 0.15 mm

Translator/caudicle type: l/cw

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: HE

/

Hoya imbricata Decaisne 1844

Flower from TG, Hawaii.

Solid green leafed clone from the Philippines.



The retinaculum is this clone enlarged about 165x. Here we have an entirely different structure than in Central

Pollinia

length	0.68 mm
widest	0.23 mm

Retinaculum

length	0.25 mm
shoulder	0.16 mm
waist	0.10 mm
hip	0.12 mm
ext.	0.11 mm

Translator

length	0.24 mm
depth	0.02 mm

Caudicle

bulb diam.	0.13 mm
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Translator/caudicle type: l/cw

Pollinia inner end type: T

Caudicle bulb: G

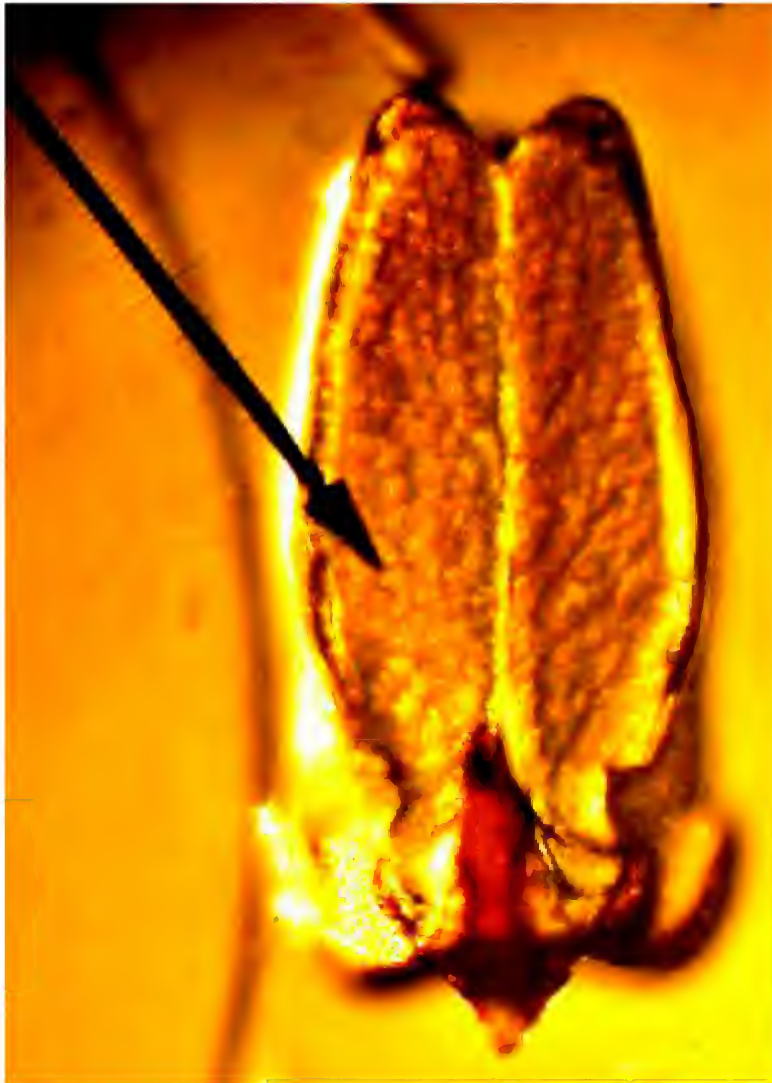
Retinacula character: LS Unusual head

Note: The retinaculum of this clone has 2 side shelves both ends of which end abruptly (they are not tapered into the main structure. The outer extension has a flared shelf. The head inner end is dentate, more so than with any other observed species.

bulb diam.	0.13 mm
------------	---------

Pollinarium enlarged about 135x. If you want to compare this to a 165x view and have a computer, drag this to 5.5" in length. The pollinia here are not like the Benguet clone and the retinaculum is certainly different from the Sulawesi species and some from Palawan Island. Based on size of flower, pollinia, translators and retinacular structure is appears there are 3 species involved. I believe detailed examination of leaf shape size, structure is warranted.

Hoya imbricata subsp. lagunaensis Kloppenburg & Mendoza
(unpublished) GM #76



Pollinarium enlarged ca. 130x.

Pollinium

length 0.67 mm
widest 0.20 mm

Retinaculum

length 0.25 mm
shoulder 0.10 mm
waist 0.05 mm
hip 0.07 mm
ext 0.05 mm

Translator

length 0.24 mm
wide 0.10 mm

Caudicle

bulb 0.10 mm

Translator/caudicle type:
fb/cw

Pollinia end type: R

Caudicle bulb: G

Retinacula character: E

Hoya kloppenburgii Green 2001
Flower from **type** clone via Ted Green, Kaaawa, HI.



Pollinarium enlarged about 122X. The pollinia are long, here turned edgewise; with a pellucid beginning at the outer apex and extending down the side nearly to the inner end accompanied inwardly by a vacuole (neither visible here). The bulbous clear caudicles are compressed somewhat and supported by massive fairly wide and deep translators both of which enter the relatively small retinaculum well down on this structure. The retinaculum has a rounded head and the bifid extensions are flared at their outer ends.

Pollinia

length	0.66 mm
widest	0.23 mm

Retinaculum

length	ca. 0.25 mm including extensions.
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Translators

	drumstick like
length	0.15 mm
wide	0.03 mm
depth	0.07 mm

Caudicles

bulb diam.	ca. 0.06 mm
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Translator/caudicle type: fb/cw

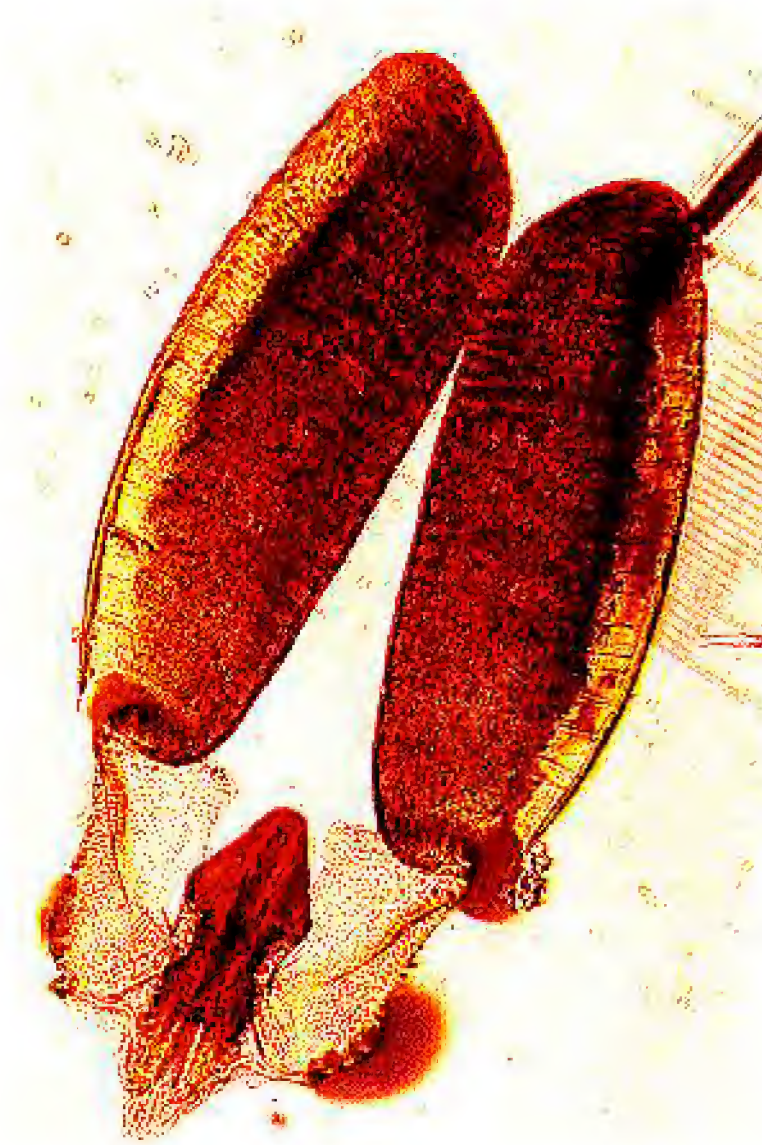
Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: E

Hoya campanulata Blume 1826

Flowered in Hawaii via Ted Green



Enlarged about 165x

Pollinarium:

Pollinia

length	0.64 mm
widest	0.21 mm

Retinaculum

length	0.30 mm
shoulder	0.10 mm
waist	0.07 mm
hip	0.08 mm
extensions	0.09 mm

Translators

length	0.25 mm
depth	0.06 mm
width	0.02 mm

Caudicle

bulb diam.	0.11 mm
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Translator/caudicle type:
fb/cw

Pollinia inner end type: RT

Caudicle bulb: G (granulate)

Retinacula character: HE

Hoya caudata Hooker f. 1883



Pollinarium enlarged about 165x. The translators are unusual, the lower surface is dark and the structure cups inward with a narrow top supporting the clear comma shaped caudicles. The translator major surface is finely granulose. Pollinia and retinacula are long and narrow.

Pollinia

length	0.62 mm
width	0.16 mm

Caudicle

bulb diam.	0.07 mm
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Retinacula character: E

Retinacula

length	0.17 mm
shoulders	0.07 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.03 mm

Translator

length	0.18 mm
depth	0.06 mm

Translator/caudicle type: fb/cw

Pollinia apex type: T

Caudicle bulb: C

Hoya benitotanii Kloppenburg & Siar 2010



Pollinarium enlarged about 165x. The pollinia are very long, translators and caudicles prominent; the retinaculum has a broad head and body with long well developed extensions.

Pollinarium:

Pollinia

length	0.57 mm
widest	0.14 mm

Retinaculum

length	0.07 mm
shoulder	0.06 mm
waist	0.04 mm
hip	0.06 mm
extensions	0.08 mm

Translators

length	0.10 mm.
depth	0.05 mm.
width	0.02 mm.

Caudicle

bulb diam.	0.05 mm
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Ret.:pol. ratio 1:3

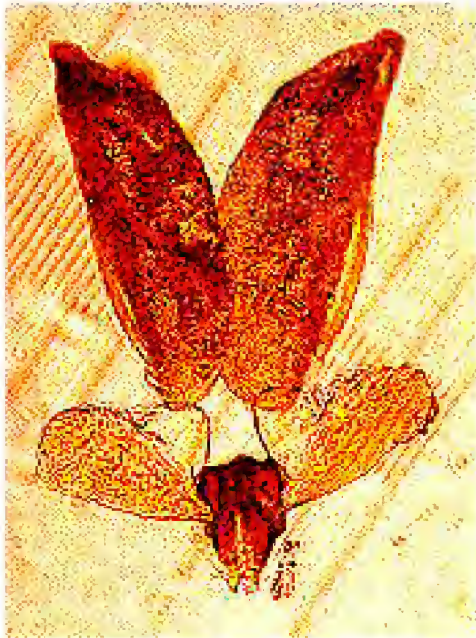
Translator/caudicle type: fb/cw

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: S

Hoya loheri Kloppenburg 1991 s.n. (UC) 1915 Type clone
Caraballo, Mt. Nueve, Luzon ,Philippines.



Pollinarium of this species is very distinct with a broad Retinaculum, really large translator arms that are widely spread. Both the translators and the clear caudicles are attached at the waste. The pollinia are narrowed toward at the inner end and terminate in a narrow rounded apex. Probably the species with the closest conformation of this pollinarium is found in the Philippine hoya species *Hoya bilobata* Schlechter.

Magnified approximately 85x.

Pollinium

length	0.56 mm
widest	0.24 mm

Retinaculum

length	0.21 mm
shoulder	0.17 mm
waist	0.09 mm
hip	0.10 mm
ext.	0.06 mm

Translators

length	0.10 mm
depth	0.03 mm

Caudicle ?

Type: C

Translator/caudicle type: fb/cw

Pollinia apex type: T

Retinacula character: S

Hoya lucyae Kloppenburg & Siar 2006 Type clone

sp. #1494 collected by David Bicknell 8 Jan. 1998, Alcoy, Cebu, Philippines.

Flower cluster sent by David Bicknell from Lilo-an, Cebu, Philippines. Collected by David & Luzviminda, January 1998 at Alcoy, Cebu in forest, elevation 500 m. epiphytic.



Pollinium enlarged about 165x, very uniform in width the length of the structure, pellucid edge does not reach the lower end.

Pollinium

length	0.55 mm
widest	0.20 mm



Retinaculum, translators and caudicle enlarged as above.

Retinaculum

length	0.19 mm
shoulder	0.08 mm
waist	0.07 mm
hip	0.08 mm
ext.	0.01 mm

Translators

length	0.18 mm
widest	0.08 mm
depth	0.02 mm

Caudicle

bulb diam.	0.07 mm
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There are actually two waste areas on the retinaculum and translators enter well down at 2nd waste area.

Translator/caudicle type: fb/cw

Pollinia apex type: T

Retinacula character: S

Hoya sp. IML 557

A hoya species of the Section Acanthostemma (Bl.) Kloppenburg. Material sent by Ann Wayman, Central Point, Oregon from Michael Myrashiro as Sp. nova. Roll 119-120 Drawing # 208. Liddle's catalogue says coll. Sabah. SBC P. Rutherford fl. 9/86. My guess is this may be *Hoya gracilis* Schlechter.



Pollinarium enlarged about 165x. The pollen cells in the pollinia appear to very fine grained, there is a relatively narrow vacuole.

Pollinia

length	0.54 mm
widest	0.20 mm

Retinaculum

length	0.22 mm
shoulder	0.10 mm
waist	0.06 mm
hips	0.10 mm
extensions	0.02 mm

Translator (narrow and long)

length	0.16 mm
depth	0.03 mm ca.

Caudicle

bulb diam.	0.09 mm
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Translator/caudicle type: fb/cw

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: S

Hoya edwinofernandoi Kloppenburg, Cajano & Hadsall 2015

Pollinarium enlarged ca. 250x.



Pollinium

length 0.53 mm
widest 0.25 mm

Retinaculum

length 0.12 mm
shoulder 0.12 mm
waist 0.09 mm
hip 0.10 mm
ext. 0.05 mm

Translator

length 0.24 mm
widest 0.12 mm

Caudicle

bulb top 0.10 cm

Translator/caudicle
type: fb/cw

Retinacula type: S
(shield)

Caudicle: C

Pollinia inner end type: R (rounded)

Hoya anncajanoae Kloppenburg & Siar 2008



Pollinarium enlarged about 45x. Fine lines in background above are 0.01 mm wide. Black arrow head is 0.1 mm long, fine lines on shaft are 0.01 mm wide.

Pollinium

length	0.52 mm
widest	0.20 mm

Retinaculum

length	0.12 mm
shoulder	0.09 mm
waist	0.05 mm
hip	0.08 mm
ext.	0.07 mm

Translators

length	0.25 mm
depth	0.02 mm
widest	0.09 mm

Caudicle

bulb diam.	0.11 mm
------------	---------

Type: C

Ratio: Retinacula/pollinium 3.1
Poll width/length 2.8

Translator/caudicle type: fb/cw

Pollinia apex type: T

Retinacula character: S

Hoya lanceolata Wallich ex Don 1825

Flower via Torill Nyhuus, Sweden.



Top view of the pollinarium enlarged about 65x.

Compare the pollinia here to *Hoya bella* Hooker.

Here the pollinia are much shorter relatively. The retinacula are both long but this one has a narrowing near and lower apex. Both have well-developed translators (long) and caudicles.

Top view of Pollinarium enlarged about 165x. Note how broad and relatively short the pollinia are, how the pellucid sterile edge does not come near the attached apex, also the large vacuole in from this edge. There are small shoulders on the retinaculum and 2 sets of protrusions lower down (these protrusions are also present in *Hoya bella* Hooker) The translators support a large bulbous end of the caudicle, somewhat triangular in outline in flat view.



Pollinia

length	0.51 mm
widest	0.22 mm

Retinaculum

length	0.27 mm
shoulder	0.09 mm
hip	0.05 mm
waist	0.08 mm
extensions	0.02 mm

Translators

length	0.15 mm
depth	0.02 mm
width	0.02 mm

Caudicle (cone shaped end)

bulb diam.	0.08 mm
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Translator/caudicle type:
l/cw

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: HE

Hoya cystiantha Schlechter 1913

Flower from Edward Gilding, Pearl City, HI.



Pollinarium enlarged approximately 165x. This is a beautiful structure, very distinctive. I am of the opinion that nearly every species could be delineated by its Pollinarium characteristics.

The pollinia are relatively short and very broad. Note how the pellucid edge cuts off at the end near the caudicle leaving the end slightly protruding. The translators are long and narrow in side view and the caudicles are perfectly formed and large. The caudicles are supported by the translators which are more broad on the top, rather wedge shaped, here you see only the outer edge.

Pollinia

length	0.49 mm
widest	0.23 mm

Retinaculum

length	0.20 mm
shoulder	0.11 mm
waist	0.06 mm
hip	0.10 mm
extensions	0.05 mm

Translators

length	0.25 mm
depth	0.06 mm
width ca.	0.03 mm

Caudicle

bulb diam.	0.11 mm
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Translator/caudicle type: l/cw
Pollinia inner end type: R
Caudicle bulb: G

Retinacula character: S

Hoya wayetii Kloppenburg 1993
Type clone #90148 flowered in Fresno, CA, USA.



Pollinarium
approx. 165x. enlarged

Pollinium

length	0.48 mm
widest	0.15 mm

Retinaculum

length	0.12 mm
shoulder	0.04 mm
waist	0.04 mm
hip	0.05 mm
extensions	0.04 mm

Translators

length	0.19 mm
depth	0.07 mm

Caudicle

bulb diam.	0.13 mm
------------	---------

Type: C

Translator/caudicle type: fb/cw

Pollinia inner end type: T

Retinacula character: E

Hoya linearis Wallich 1825
Via Torill Nyhuus



Pollinarium		Caudicle bulb diam.	0.07 mm
length	0.48 mm		
widest	0.19 mm		
Retinaculum			
length	0.16 mm		
shoulder	0.09 mm		

	waist	0.04 mm
	hip	0.05 mm
	ext.	0.02 mm
Translator		
	length	0.19 mm
	depth	0.02 mm

Hoya maxima (Karst.) Warburg 1907
Pollinarium from flower collected in Central Sulawesi 1994.



Magnified approximately 165x.

Pollinium

length: 0.48 mm
widest: 0.16 mm

Retinaculum

length: 0.19 mm
shoulder: 0.18 mm
waist: 0.05 mm
hip: 0.09 mm
ext.: 0.07 mm

Translator

length: 0.26 mm
depth: 0.06 mm

Caudicle

bulb diam.: 0.08 mm

Translator/caudicle type: fb/cw

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: E

Hoya merrillii Schlechter 1904
900307



Pollinarium

length	0.47 mm.
widest	0.19 mm.

Retinaculum

length	0.12 mm.
shoulder	0.13 mm.
waist	0.09 mm.
hip	0.12 mm.
extensions	0.11 mm.

Translators

length	0.15 cm.
widest	0.11 mm.

Caudicle bulb

0.06 mm.

Translator/caudicle Type: fb/cw ?

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: S

Retinacula character: S

Hoya bicknellii Kloppenburg 1999

Flowers from Type clone via David Bicknell.



Pollinarium

Photomicrograph approx. 165x.

Note: The thickened wedge-shaped translator arms. The bulbous shaped caudicles connected to the retinaculum at its waist. The elongated pollinia, rounding outward at the inner apex, stuck to the bulbous caudicles at the inner apex. That the sterile pellucid outer edge of the pollinia do not extend to the inner (lower) apex. That the sterile edge extends over the outer apical area of the pollinia.

Pollinarium: Somewhat narrow, long Pollinia long and oval, tapering inward at upper apex (inner), length 0.46 cm.. rather uniform in width, widest 0.15 cm. Prominent opaque sterile edge. Most similar to the pollinium of *Hoya micrantha* Hooker f.

Retinaculum

length	0.15 cm (very long pointed ends).
head	0.05 cm
waste	0.04 cm
hips	0.06 cm

Translators, drumstick shaped

length	0.15 cm
widest outer end.	0.06 cm

Caudicles clear, sticky

bulbous ca.	0.07 mm long and as wide.
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Type: G

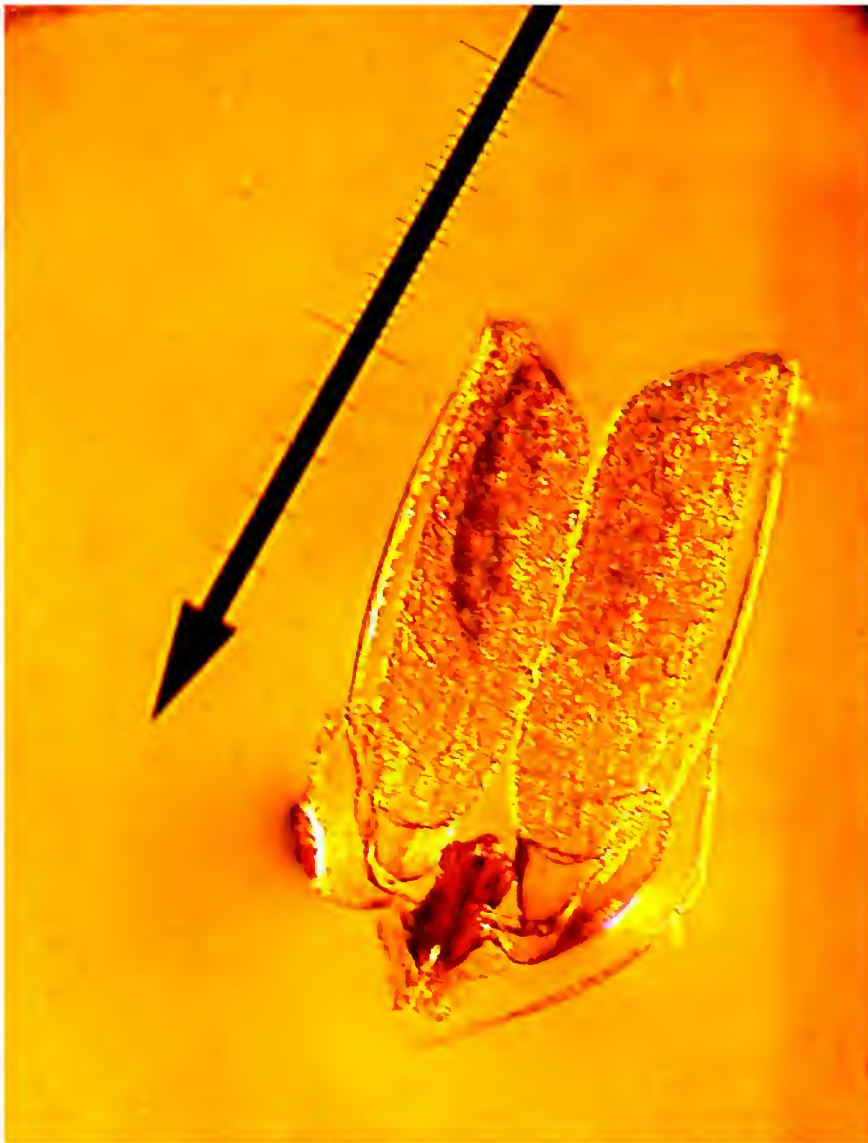
Translator/caudicle type: fb/cw

Caudicle bulb: G

Pollinia end type: T

Retinacula character: S

Hoya chiekoae Kloppenburg, Ferreras & Mendoza 2012



Pollinarium:

Enlarged ca. 160x.

Pollinium

length 0.45 mm

widest 0.14 mm

Retinaculum

length 0.10 mm

shoulder 0.06 mm

waist 0.05 mm

hip 0.06 mm

ext. 0.03 mm

Translators

length 0.20 mm

depth 0.03 mm

Caudicle

bulb diam. 0.07 mm

Translators should most likely be classified as perpendicular "p".

Ratios: p/ret 4.5 p/w 3.2

Translator/caudicle type: fb/cw

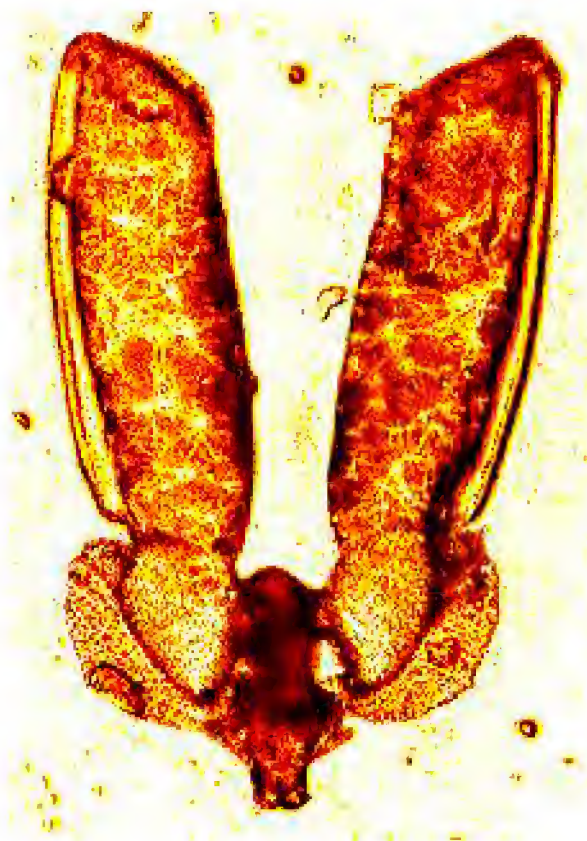
Pollinia inner apex type: F

Caudicle bulb: C

Retinacula character: S

Hoya kentiana Burton 1991

Pollinarium from clone Perpich 428 via Ted Green, Kaaawa, HI. USA.



The pollinarium enlarged approx. 165 times. Compare this with other pollinarium and you will find many distinct differences in the species. Here the usually clear caudicles seem impregnated with fine granular material or cellular structure. The translator arms are well formed more darkly granular and from the left end you can discern that this structure has a conceived top which is broad enough to support the caudicles, both structures are attached well down on the dark retinaculum a

It the waist area. The pollinia are tapered inward at the inner apex and the pellucid sterile edge extends down the side to near the point where the pollinia are sunken into the caudicle, just in from this edge is a long vacuole.

Pollinium

length: 0.45 mm
widest: 0.15 mm

Retinaculum

length: 0.15 mm
shoulder: 0.08 mm
waist: 0.05 mm
hip: 0.10mm
ext.: 0.04 mm

Translators

length: 0.21 mm
depth: 0.05 mm

Caudicle

diam.: 0.13-014 mm

Translator/caudicle type: fb/cw

Pollinia apex type: F

Caudicle bulb Type: G

Retinacula character: BH

Hoya rosarioae Kloppenburg & Siar 2015

sp. CAHUP 5268

as *Hoya obscura* Burton. Photos 14 November 2006

Determination: Labeling is incorrect.



Pollinarium greatly enlarged, spread out as it was difficult to get it to lay properly.

Pollinium

length	0.45 mm
widest	0.14 mm

Retinaculum

length	0.10 mm
shoulder	0.05 mm
waist	0.03 mm
hip	0.05 mm
ext.	0.03 mm

Translators

length	0.17 mm
depth	0.05 mm

Caudicle

bulb diam.	0.07 mm
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Translator caudicle type: fb/cw

Pollinia inner end type: T

Caudicle bulb: C ?

Retinacula character: R

Hoya sp. NS-0009

Collected by Nathalie Evelinsdotter on Mindoro, Philippines

Photographed 23 Feb. 2005



Pollinarium enlarged about 165x. I did not get a good overall picture. The retinaculum appears to be narrow. Pollinia also long and narrow, rounded at both ends. Translators are thin and the caudicles appear to be cone shaped.

Pollinium

length	0.45 mm
widest	0.10 mm

Retinaculum

length	0.19 mm
Widest ca.	0.05 mm

Translators

length	0.15 mm
depth	0.01 mm

Caudicle

bulb end diam.	0.08 mm
----------------	---------

Remember the translators and the caudicle both are attached to a inner wall of the retinaculum and enter through a side channel. The retinaculum here may be twisted on its axis.

Translator caudicle type: l/cw

Pollinia inner end type: T

Caudicle bulb: G

Hoya micrantha Hooker f. 1883

flowered at Fresno, CA., 19 April 1990.



Pollinarium enlarged about 165x. The pollinia have a slight tendency to have the apex apiculate but not very noticeably. Again compare this pollinarium with that of *Hoya plicata* King and Gamble. Here the translators are long with rounder form at the base. The translators are large but not massive. The retinaculum is similar to the other species, but not quite as elongated.

Translator/caudicle type: fb/cw

Pollinia inner apex type: T

Caudicle bulb: C

Retinacula character: LS

Pollinia

length	0.44 mm
widest	0.14 mm

Retinaculum

length	0.09 mm
shoulder	0.08 mm
waist	0.62 mm
extensions	0.06 mm

Translators

length	0.14 mm
depth	0.08 mm

Caudicle

bulb diam.	0.10 mm
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Hoya rizaliana Kloppenburg 1991



Pollinarium with measuring arrow in upper right. The pollinia are very wide and with flat truncated inner apex. The retinaculum is relatively small with the translator large and oval shaped entering at the waste of the retinaculum. The clear caudicle bulbs are more centrally confined.

Pollinia

length	0.43 mm
widest	0.17 mm

Retinaculum

0.08 mm long

Translators

length	0.17mm
widest	0.06 mm

Caudicle bulb

0.06 mm in diam.

Translator/caudicle type: fb/cw

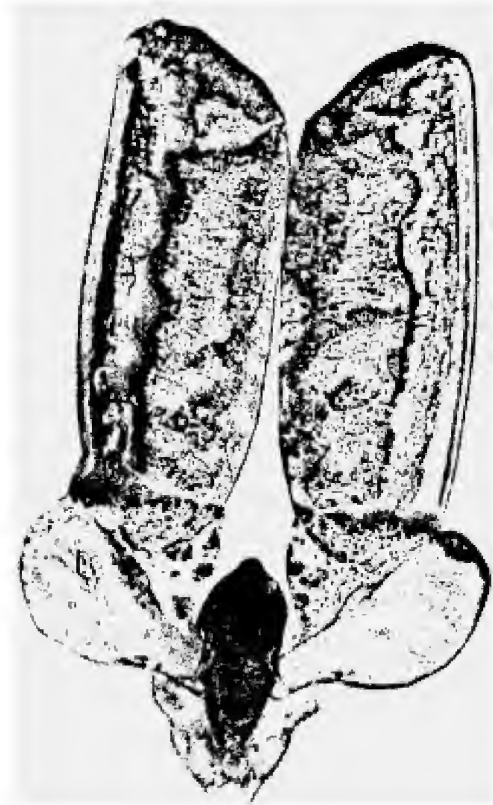
Pollinia inner end type: F

Caudicle bulb: C ?

Retinacula character: R

Hoya burtoniae Kloppenburg 1990

Pollinarium from clone #81084. **Type** clone



Magnified approximately 165x.

Pollinium

length: 0.43 mm
width: 0.15 mm

Retinaculum

length: 0.14 mm
shoulder: 0.07 mm
waist: 0.05 mm
hips: 0.04 mm

Translators

length: 0.19 mm
depth: 0.09 mm

Caudicle

bulb diam.: 0.08 mm

Type: Granulate

Translator/caudicle type: fb/cw

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: LS

Hoya rhodostella Ridley 1923

Flower from **Type** material.



Pollinarium enlarged about 165x. On most old pressed flowers this structure is well preserved and here I was able to get several good photos of the structure.

Pollinia

length	0.43 mm
widest	0.18 mm

Retinaculum

length	0.12 mm
shoulders	0.09 mm
waist	0.07 mm
hip	0.08 mm
extensions	0.04 mm

Translators

length	0.15 mm
depth	0.05 mm

Caudicle

bulb diam.	0.11 mm
------------	---------

Type: G

Translator/caudicle type: fb/cw

Pollinia inner end type: RT

Retinacula character: S

Hoya anncajanoae subsp. lagyoensis Kloppenburg & Mendoza
(unpublished) GM #126



Pollinarium
enlarged ca. 150x.

Pollinium

length	0.42 mm
widest	0.19 mm

Translator

length	0.22 mm
widest	0.10 mm

Retinaculum

length	0.15 mm
shoulder	0.09 mm
waist	0.06 mm
hip	0.09 mm
ext.	0.03 mm

Caudicle

bulb top	0.09 mm
bulb length	0.10 mm
tail	0.04 mm

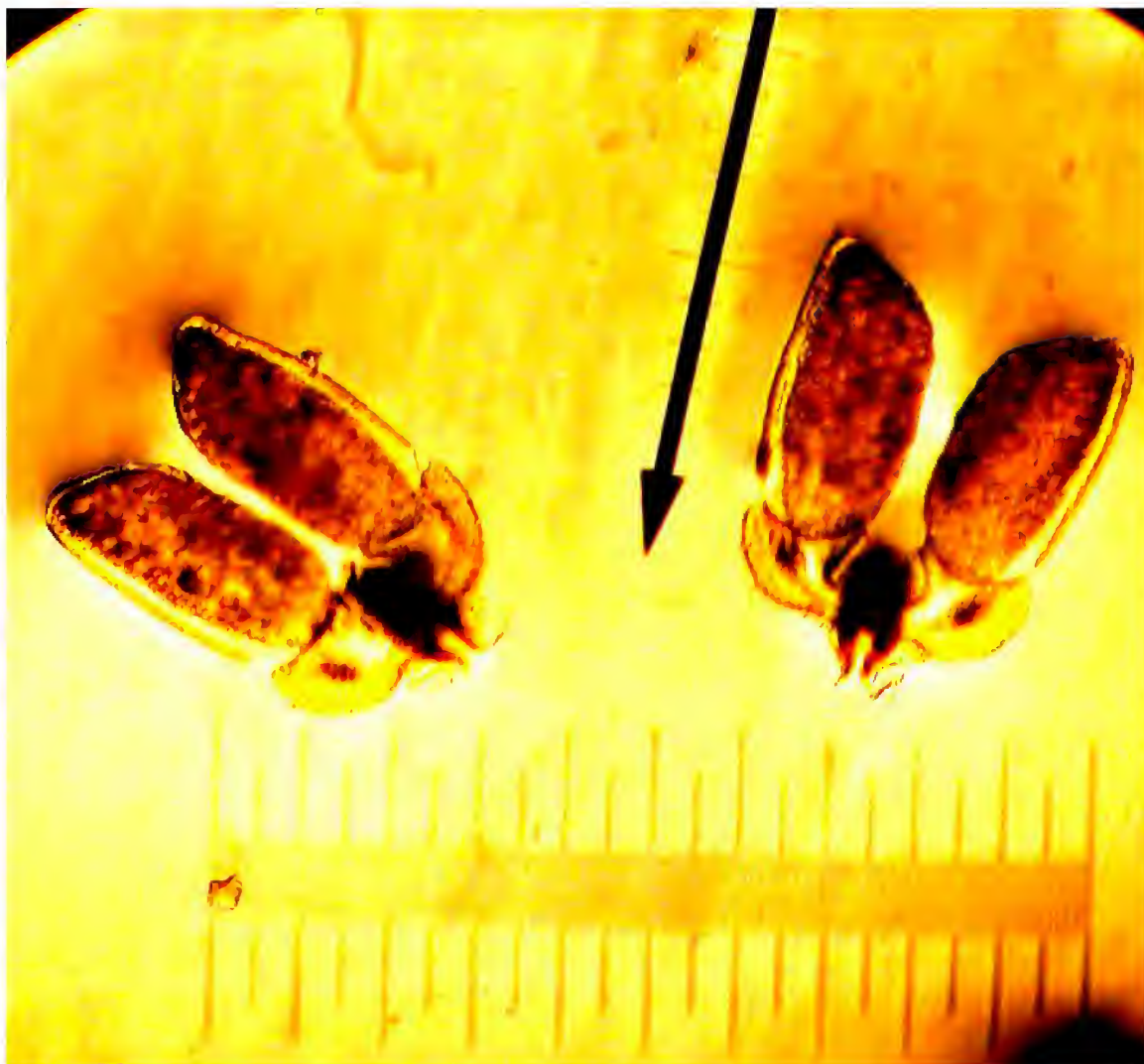
Translator/caudicle type: fb/cw

Caudicle type: G

Pollinia apex type: RT

Retinacula character: LS

Hoya kanlaonensis Kloppenburg, Siar & Ferreras 2010 Type clone



Pollinaria enlarged ca. 180x.

Pollinium

length	0.42 mm
widest	0.20 mm

Caudicle

bulb diam.	0.10 mm
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Type: G

Retinaculum

length	0.15 mm
shoulder	0.10 mm
waist	0.09 mm
hip	0.10 mm
ext	0.06 mm

Translator

length	0.20 mm
depth	0.03 mm

Retinacula character: S ?

Translator/caudicle type: fb/cw

Pollinia apex type: T

Caudicle bulb: G

Hoya myrmecopa Kleijn and Donkelaar 1999

Flower grown by Ted Green **Type** clone.



Pollinarium enlarged about 165x.

Pollinium

length	0.42 mm
widest	0.16 mm

Retinaculum

length	0.17 mm
shoulders	0.10 mm
waist	0.07 mm
hip.	0.08 mm
extensions	0.10 mm

Translators

length	0.12 mm
widest	0.04 mm
depth	0.01 mm

Caudicle

bulb diam.	0.06 mm
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Translator/caudicle type: fb/cw

Pollinia apex type: F

Caudicle bulb: C

Retinacula character: HL

Hoya sp. NS00-004

Via Torill Nyhuus march 2007. Data 5/14/07, 18 flowers in cluster pedicels various lengths curved Section Acanthostemma.

Pollinarium enlarged about 55x Caudicles are cup shaped.



Pollinium

length	0.42 mm
widest	0.16 mm

Retinaculum

length	0.10 mm
shoulder	0.06 mm
waist	0.05 mm
hip	0.06 mm
ext	0.03 mm

Translator

length	0.16 mm
widest	0.04 mm

Caudicle

bulb diam.	0.07 mm top
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Translator/caudicle type: fb/cw

Pollinia inner apex type: T

Caudicle bulb: C

Retinacula character: S

Hoya obscura Elmer ex Burton 1986

Flower from clone via Peter Tsang 1979,
flowered in Fresno, CA.



The distinctive Pollinium with long translator arms, and clear bulbous caudicles into which the lower end of the pollinia are pressed.
Magnified ca. 165x.

Pollinium

length	0.41 mm
widest	0.14 mm

Retinaculum

length	0.13 mm
shoulder	0.06 mm
waist	0.03 mm
hip	0.06 mm
ext.	0.02 mm

Translators

length	0.16 mm
depth	0.03 mm

Caudicle

bulb diam.	0.06 mm
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Type: clear

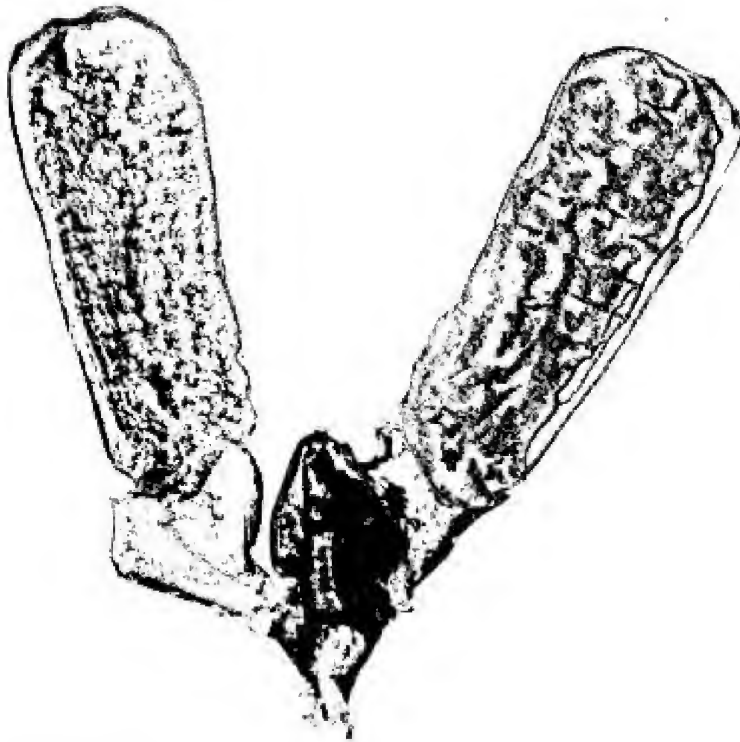
Translator/caudicle type: fb/o

Pollinia end type: F

Caudicle bulb: C

Retinacula character: LS

Hoya sp. Edano/Gutierrez (PNH) 37800 1957
Irosin, Sorsegon, Luzon Philippines.



Magnified
approximately 165x.

Pollinium

length	0.41 mm
widest	0.16 mm

Retinaculum

length	0.16 mm
shoulder	0.12 mm
waist	0.08 mm
hip	0.10 mm
ext.	0.08 mm

Translators

length	0.18 mm
depth	0.04-0.08 mm, broad outer end.

Caudicle

bulb diam.	0.10 mm
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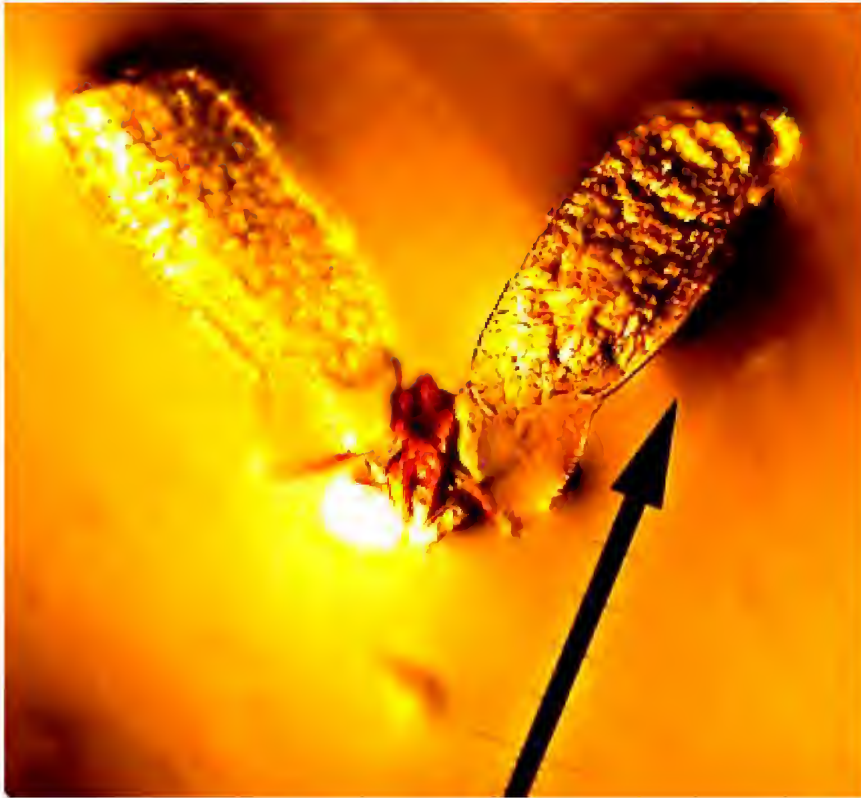
Translator/caudicle type: fb/o

Pollinia end type: R ?

Caudicle bulb: C

Retinacula character: S ?

Hoya affina Kloppenburg & Mendoza
(unpublished) GM #80



Pollinarium
enlarged ca. 130x.

Pollinium
length 0.40 mm
widest 0.15 mm

Retinaculum
length 0.10 mm
shoulder 0.06 mm
waist 0.03 mm
hip 0.07 mm
ext. 0.05 mm

Translator
length 0.15 mm
end 0.10 mm
base 0.08 mm

Caudicle
cw 0.10 x 0.10 mm

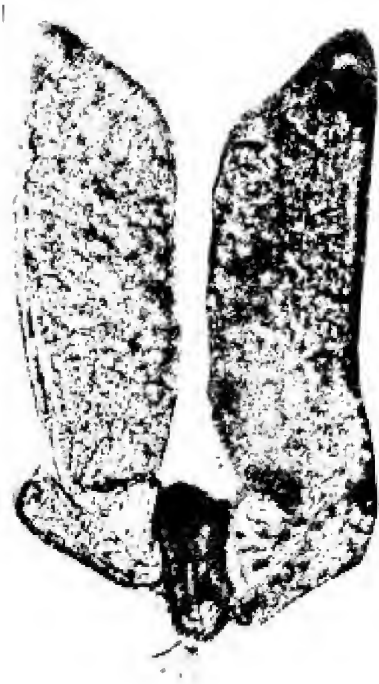
Translator/caudicle type: fb/cw

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: S

Hoya sp. PNH 4936 Gaerlan & Fuentes
Panay, Antique Prov., Mt. Midia-as, Culasi Hargod, Tubid
Philippines.



Magnified approximately 165x.

Pollinium

length: 0.40 mm
widest: 0.14 mm

Retinaculum

length: 0.11 mm
shoulder: 0.07 mm
waist: 0.05 mm
hip: 0.06 mm
ext.: 0.04 mm

Translators

length: 0.02 mm
depth: 0.04 mm

Caudicle

bulb. diam.: 0.07 mm

Translator/caudicle type: fb/cw

Pollinia inner end type: F

Caudicle bulb: G

Retinacula character: S

Hoya scortechinii King & Gamble 1908

Pollinarium from flower sent via Ted Green.



This is a photo of the retinaculum enlarged about 165x. The pellucid edge on the pollinia is straight, loops over the top and seems to end about 3/4 the way down the side, with a winged vacuole below. The head of the retinaculum is rounded, it is relatively large and short. The translators are narrow in side view and the clear caudicles are very visible (especially on the right side in the photo)

Pollinium

length	0.40 mm
widest	0.21 mm

Retinaculum

length	0.23 mm
shoulder	0.13 mm
waist	0.10 mm
hip	0.13 mm
extensions	0.06 mm

Translators

length	0.30 mm
depth	0.80 mm

Caudicles

diameter	0.05 mm
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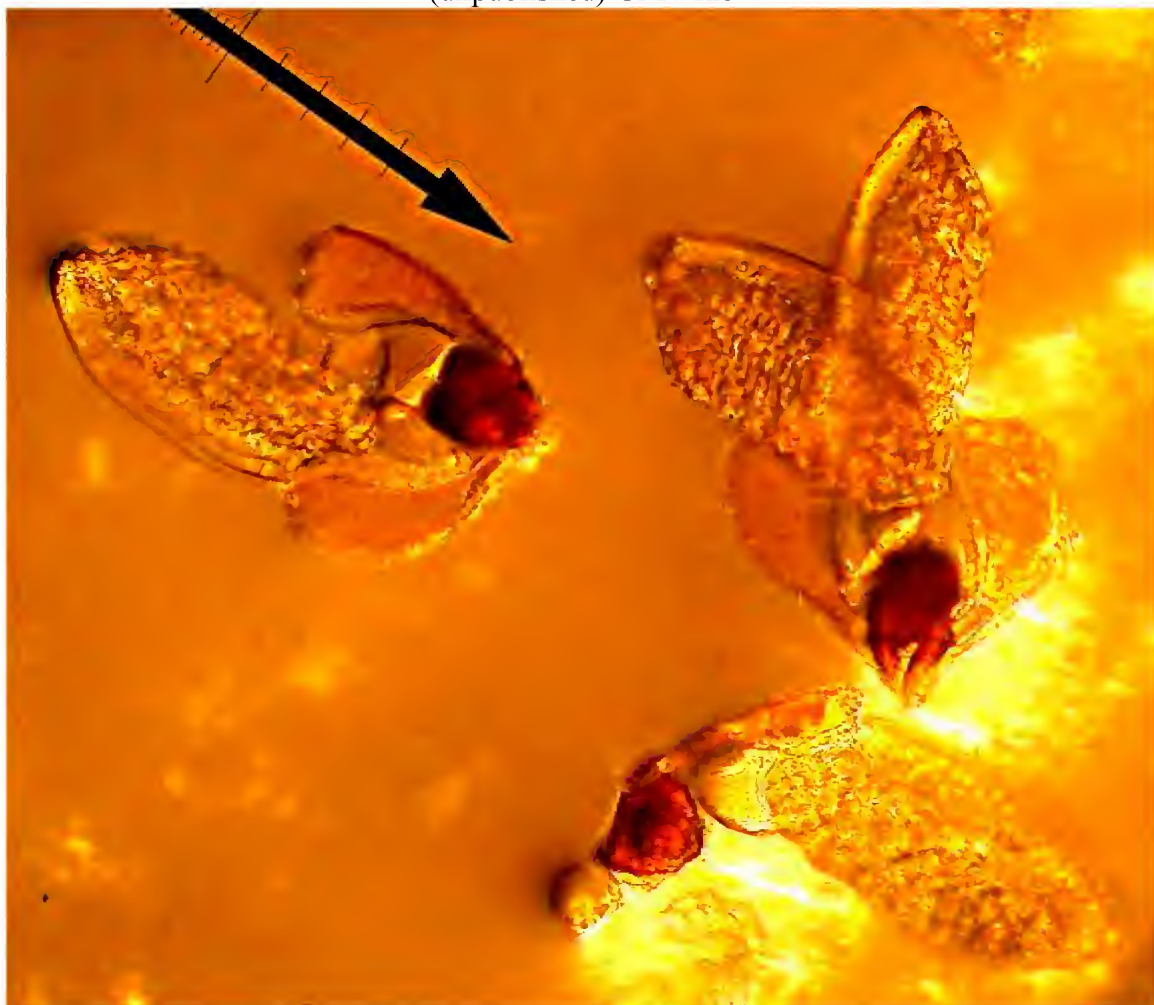
Translator/caudicle type: l/cw

Pollinia apex type: RT

Caudicle bulb: G

Retinacula character: LN

Hoya wayetii subsp. lagyoensis Kloppenburg & Mendoza
(unpublished) GM #125



Pollinarium enlarged slightly over 120x.

Pollinium

length	0.39 mm
Widest	0.17 mm

Retinaculum

length	0.10 mm
shoulder	0.10 mm
waist	0.09 mm
hip	0.10 mm
ext.	0.06 mm

Translator

length	0.25 mm
widest	0.10 mm

Caudicle

bulb diam.	0.10 mm
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Translator/caudicle type: fb/cw

Pollinia apex type: F

Caudicle bulb: G

Retinacula character: R

Hoya litoralis Schlechter 1905

TG as IML 708



Pollinarium enlarged about 165x.

Pollinia

length	0.39 mm
widest	0.15 mm

Retinaculum

length	0.15 mm
shoulder	0.06 mm
waist	0.04 mm
hip	0.06 mm
ext.	0.05 mm

Translator

length	0.14 mm
depth	0.05 mm
width	0.03 mm

Caudicle

bulb diam.	0.10 mm
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Schlechter said retinacula is minute (not here)
also translators very small wedge shaped.

Translator/caudicle type: fb/o

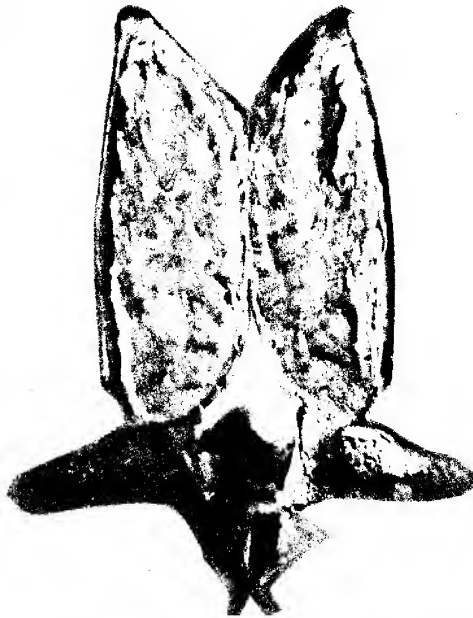
Pollinia inner apex type: F

Caudicle bulb: G

Retinacula character: HS

Hoya nummularioides Constantin 1912

Flowers from “red” & “pink” (inner coronal colored) clones, Thailand.



Red clone magnified approximately 165x.

	<u>red clone</u>	<u>pink clone</u>
Pollinium		
length:	0.38 mm	0.34 mm
widest:	0.12 mm	0.12 mm
Retinaculum		
length:	0.14 mm	0.15 mm
shoulder:	0.08 mm	0.09 mm
waist:	0.05 mm	0.06 mm
hip:	0.07 mm	0.08 mm
ext.:	0.05 mm	0.05 mm
Translators		
length:	0.16 mm	0.01 mm
depth:	0.02 mm	0.02 mm
Caudicle		
bulb diam.:	0.07 mm	0.05 mm



Pink clone magnified approximately 165x.

Comments: I assume these are from the same species, since the major features are very similar. The translators are a little shorter on the Pink clone and there are other minor (hundredths of a millimeter) differences. Overall the plant, foliage and growth habits are very similar.

Translator/caudicle type: fb/cw

Pollinia inner apex type: F

Caudicle bulb: ?

Retinacula character: R

Hoya panayensis Kloppenburg & Siar 2009



Pollinarium enlarged about 85x.

Pollinium

length 0.37 mm
widest 0.14 mm

Ratio: pol./width 2.6
pol./ret. 2.6

Retinaculum

length 0.13 mm
shoulder 0.07 mm
waist 0.03 mm
hip 0.04 mm
ext. 0.01 mm

Translator/caudicle type: fb/cw

Pollinia inner apex type: F

Caudicle bulb: G

Translator

length 0.11 mm
depth 0.02 mm

Caudicle bulb diam. 0.05 mm



Pollinium enlarged as above .

Foliage glabrous, elliptic-lanceolate, apex acute, nerves pinnate, base sub-obtuse to ovate. 3.6 – 7.6 cm long x 1.5 - 2.7 cm at the widest.

Hoya lacunosa Blume 1826
Flower from blooming at Fresno, CA., USA.



The pollinium magnified approximately 165 times. Note the darkened translator arms are attached well down on the retinaculum below the waste area and are rounded at the outer extremity. The caudicles are very inflated and seem to attach well down on the long waste of the retinaculum. The pollinia have a well defined pellucid edge that extends all the way to the apex. The outer apex tapers inward. The Pollinia of hoya species are each individualistic and distinctive.

Pollinium

length	0.37 mm
widest	0.14 mm

Retinaculum

length	0.10 mm
shoulder	0.06 mm
waist	0.03 mm
hip	0.05 mm
extensions	0.02 mm

Translators

length	0.17 mm
depth	0.05 mm

Translator/caudicle type: fb/cw

Pollinia inner apex: F

Caudicle bulb: C

Retinacula character: R

Caudicle

bulb diam.	0.04 mm
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Hoya brevialata Kleijn & Donkelaar 2001 Type clone
Pollinarium from Flower of Sulawesi, Indonesia, 1994.



Pollinarium enlarged about 165x. This is a very distinctive structure.

Pollinia

length	0.37 mm
widest	0.14 mm

Retinaculum

length	0.11 mm
shoulder	0.06 mm
waist	0.03 mm
hip	0.05 mm
extensions	0.06 mm

Translators

length	0.19 mm
widest	0.02 mm ca.
depth	0.04 mm

Caudicles

bulb	0.09 mm
length	0.14 mm

Translator/caudicle type: fb/cw

Pollinia inner apex type: FT

Caudicle bulb: G

Retinacula character: S

This species was previously thought to be *Hoya incurvula* Schlechter.

Hoya santafeensis Kloppenburg & Mendoza 2015

GM #179

Pollinarium enlarged 200x.



Pollinium

length
0.37 mm
widest
0.15 mm

Retinaculum

Caudicle

length 0.10 mm
shoulder 0.06 mm
waist 0.04 mm
hip 0.07 mm
ext. 0.05 mm

bulb 0.08 cm x 0.10 mm

Translator

length 0.18 mm
widest 0.05 mm

Translator/caudicle type: fb/cw

Pollinia apex type: F

Caudicle bulb: C

Retinacula character: 2S

Hoya rima Kloppenburg, Mendoza & Ferreras 2014
GM #72



Pollinarium enlarged ca.
170x.

Pollinia:

length 0.37 mm
widest 0.14 mm

Retinaculum:

length 0.08 mm
shoulder 0.07 mm
waist 0.04 mm
hip 0.06 mm
extensions 0.06 mm

Translator:

length 0.14 mm
widest 0.04 mm

Caudicle:

bulb diam. 0.06 mm

Translator/caudicle Type:

fb/cw

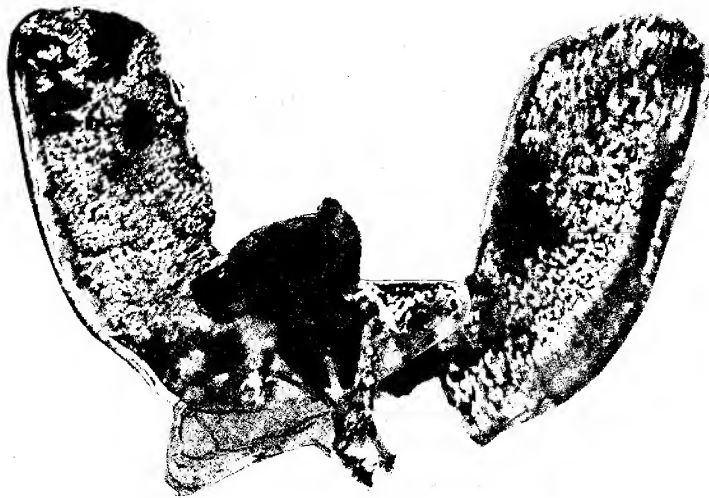
Pollinia apex type: T

Caudicle bulb: C

Retinacula character: S

Hoya sp. UC 424
Zamboanga, Philippines.

Magnified approximately 165x



Pollinium

length: 0.36 mm

widest: 0.15 mm

Retinaculum

length: 0.12 mm

shoulder: 0.15 mm

waist: 0.05 mm

hip: 0.08 mm

ext.: 0.03 mm

Translators

length: 0.15 mm

depth: 0.02 mm

Caudicle

bulb. diam.: ?

Translator/caudicle type: fb/cw

Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: HU

Hoya sipitangensis Kloppenburg & Wiberg 2002 Type clone



Pollinarium enlarged about 165x.

Pollinia

length	0.36 mm
widest	0.09 mm

Retinaculum

length	0.06 mm without extensions
head	domed
shoulders	0.04 mm
waist	0.05 mm
hips	0.02 mm
extensions	0.04 mm

Translator

length	0.13 mm.
depth	0.03 mm
width	0.01 mm ca.

Caudicle

bulb diameter	0.04 mm ca.
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Type: C



Another view of the pollinarium same enlargement as above but focused on the retinaculum to show it more distinctly.

Translator/caudicle type: fb/cw

Pollinia apex type: F

Caudicle bulb: C

Retinacula character: S

Hoya burtoniae Kloppenburg 1990



Pollinarium enlarged about 165x. There is a fairly wide vacuole all away along the pellucid edge of the pollinia. The translator are well developed drumstick shaped, supporting the clear pollywog shaped caudicles. The retinaculum has a high shoulder and a knob below this just above the hip area.

Pollinia

length	0.36 mm
widest	0.14 mm

Retinacula

length	0.07 mm
shoulder	0.05 mm
waist	0.04 mm
hip	0.05 mm
extensions	0.03 mm or more

Translators

length	0.13 mm
widest	0.06 mm

Caudicle bulb diameter 0.05 mm

Translator/caudicle type: fb/o

Pollinia inner end type: T

Retinacula: HU

Caudicle: C

Hoya poolei White & Francis 1928

Flowered and grown in Fresno, CA. USA.



Here is a really distinctive pollinarium enlarged about 165x. Again in some ways it is similar to the one of *Hoya eitapensis* Schlechter in the structure of the translator arms but here the caudicle is also structured (fine circular pebbling of the surface, not clear). The pollinia are shaped like large cleavers with unusual apices. The retinacula is also unusual with a distinct head area, a narrow waist and very wide hips with short extensions.

Pollinium

length	0.36 mm
widest	0.14 mm

Retinaculum

length	0.13 mm
shoulder	0.06 mm
waist	0.04 mm
hip	0.08 mm
extensions	0.04 mm

Translators

length	0.14 mm
depth	0.06 mm

Caudicle

bulb. diam.	0.09 mm
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Translator/caudicle type: fb/cw

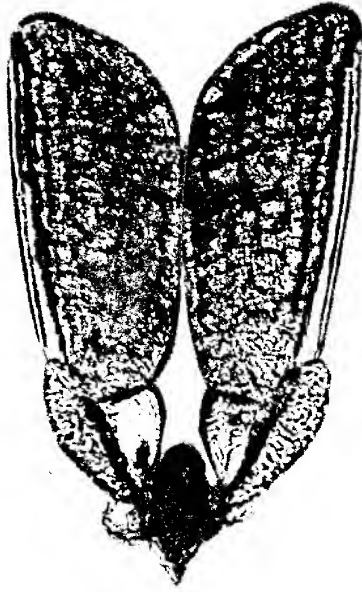
Retinacula character: S

Pollinia apex type: T

Caudicle bulb: G

Hoya lacunosa Blume 1826

Pollinarium from flower of clone labeled var. pallida.



Pollinarium Magnified
approximately 165x

Pollinia

length: 0.36 mm
widest: 0.14 mm

Retinaculum

length: 0.09 mm
shoulder: ca. 0.05 mm
waist: ca. 0.04 mm
ext.: 0.03 mm

Translators

length: 0.16 mm
depth: 0.03 mm

Caudicle

bulb diam.: 0.05 mm

Translator/caudicle type: fb/cw

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: R

Hoya geotropa Kloppenburg & Mendoza
(unpublished) GM #141



Pollinarium
enlarged ca.
120x
Measurements
from the 3
photos of this
structure.

Pollinium

length 0.36 mm
widest 0.13 mm

Translator

length 0.09 mm
widest 0.05 mm

Retinaculum

length 0.20 mm
shoulder 0.07 mm
waist 0.05 mm
hip 0.07 mm
ext 0.05 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle Type: fb/cw

Pollinia apex type: TR

Caudicle bulb: C

Hoya apoensis subsp. *sagittaria* Kloppenburg, Siar & Ferreras 2010



Pollinium

length	0.35 mm
widest	0.08 mm

Retinaculum

length	0.13 mm
shoulder	0.08 mm
waist	0.06 mm
hip	0.08 mm
ext.	0.04 mm

Translator

length	0.15 mm
depth	0.04 mm

Caudicle

bulb diam.	0.09 mm
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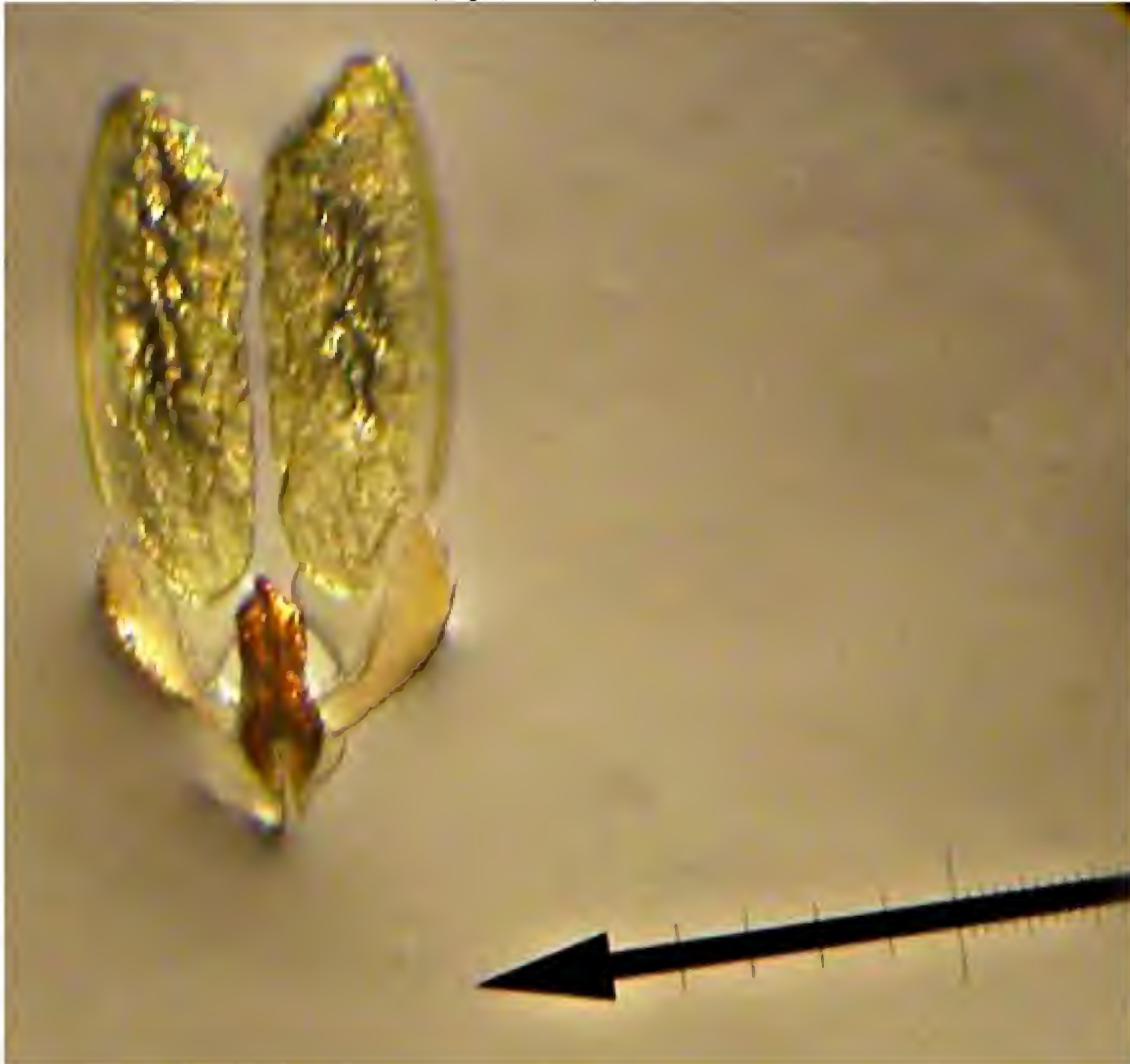
Type: G

Retinacula type: 2S

Translator/caudicle type: fb/cw

Pollinia inner apex type: R

Hoya mitisa Kloppenburg & Mendoza
(unpublished) GM #148



Pollinarium enlarged 180x.

Pollinium

length	0.35 mm
widest	0.12 mm

Retinaculum

length	0.11 mm
shoulder	0.05 mm
waist	0.04 mm
hip	0.06 mm
ext.	0.05 mm

Translator

length	0.15 mm
widest	0.05 mm

Caudicle

bulb 0/07 mm, top x 0.08 mm, depth

Translator/caudicle type: fb/cw

Retinacula character: E

Pollinia inner apex type: F

Caudicle bulb: C

Hoya eitapensis Schlechter 1909

Flowered in Fresno, CA. USA.



Pollinarium enlarged about 165x. The pollinia are oval with the apex taper inward as do nearly all pollinia in the hoya species. The pellucid edge extends from the top to near the lower apex. The dark retinaculum is relatively small, the translators long and drumstick shaped, with wide outer apices. The clear caudicles are large with bulbous ends. The extensions narrow (legs). I believe the one most distinct thing is the wideness of the pollinia and rather uniform width throughout.

Pollinia

length	0.35 mm
widest	0.15 mm

Retinaculum

length to crotch	0.10 mm
head	0.09 mm wide.
waist	0.06 mm
hips	0.08 mm
extensions	0.05 mm

Translators

length	0.10 mm
widest	0.07 mm; complex

Caudicles

bulbous end	oval, 0.10 mm x 0.06 mm
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Translator/caudicle type: fb/o

Pollinia apex type: RT

Caudicle bulb: G

Retinacula character: LS

***Hoya pseudolittoralis* Norman 1937**

Flower from clone van Ann Wayman purchased as *Hoya gracilis* Schlechter.



Pollinarium enlarged about 165x. The pellucid edge of the pollinia are distinct looping over the outer apex with a well-developed vacuole inwardly, apex is sloping inwardly and basely rounded, supported by the clear caudicles. The translators are structured relatively deep. The retinacula is much larger here than with Schlechter's *Hoya anulata*.

Pollinia

length	0.35 mm
widest	0.14 mm

Retinaculum

length	0.12 mm overall
shoulder	0.05 mm wide
hip	0.04 mm
waist	0.05 mm
extensions	0.05 mm; thick

Translator

length	0.13 mm
depth	0.06 mm
width	ca. 0.03 mm

Caudicle

bulb diam.	0.1 mm
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Translator/caudicle type: fb/cw

Pollinia apex type: F

Caudicle bulb: C

Retinacula character: LS

Hoya pseudoleytensis subsp. majora Kloppenburg & Mendoza
(unpublished) GM #104



Pollinarium enlarged ca. 160x.

Pollinium

length	0.35 mm
widest	0.13 mm

Retinaculum

length	0.10 mm
shoulder	0.08 mm
waist	0.04 mm
hip	0.08 mm
ext.	0.03 mm

Translator

length	0.14 mm
widest	0.07 mm

Caudicle

bulb diam. 0.07 x 0.06 mm

Translator/caudicle type: fb/cw

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: S ?

Hoya davidcummingii Kloppenburg 1995
Type material #9 (BISH).



Pollinarium approximately 165x.

Pollinium

length: 0.35 mm
widest: 0.17 mm

Retinaculum

length: 0.30 mm
shoulder: 0.10 mm
waist: 0.09 mm
hips: 0.10 mm
ext.: 0.65 mm

Translators

length: 0.15 mm
depth: 0.09 mm
width: 0.03 mm

Caudicle

diam.: 0.07 mm

Translator/caudicle type: fb/cw

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: HE

Hoya corazoniae Kloppenburg, Siar & Ferreras 2010



Pollinarium enlarged ca. 80x

Pollinium

length	0.34 mm
widest	0.12 mm

Retinaculum

length	0.10 mm
widest	0.09 mm

Translator

length	0.07 mm
depth	0.02 mm

Caudicle

bulb diam.	0.06 mm
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Translator/caudicle type. fb/cw

Pollinia apex type: RT

Caudicle bulb: C

Retinacula character: HE ?

Hoya setsukokobayashiae Kloppenburg & Mendoza
(unpublished) GM #3



Pollinarium enlarged ca. 230x.

Pollinium

length 0.34 mm
widest 0.13 mm

Retinaculum

length 0.08 mm
shoulder 0.04 mm
waist 0.03 mm
hip 0.04 mm
ext. 0.03 mm

Translator

length 0.12 mm
width 0.04 mm

Caudicle

bulb diam. 0.07 mm

Translator/caudicle type: fb/cw

Pollinia apex type: RT

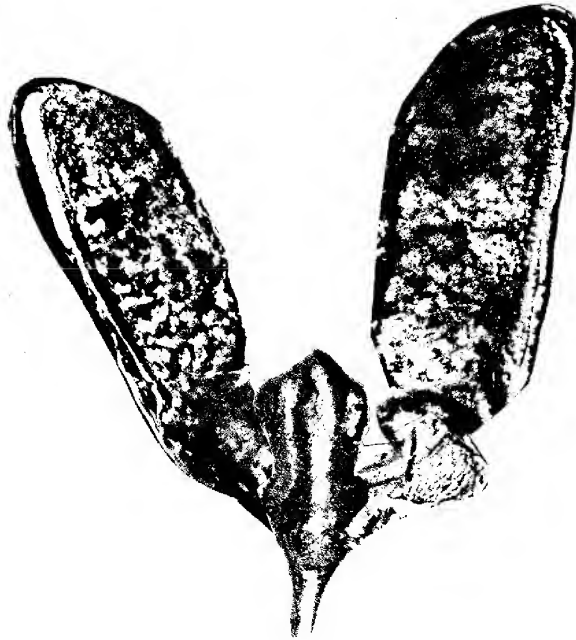
Caudicle bulb: C

Retinacula character: S ?

Ratio: p/r 4.1 p/w 2.6

Hoya tsangii Burton 1991

Pollinarium from **Type** Elmer #13372
collected from Cabadbaran, 1000' elevation, Mt. Bulusan
Sorsogon Prov. Luzon, Philippines (1916).



Magnified approximately
165x.

Pollinium

length: 0.34 mm
widest: 0.13 mm

Retinaculum

length: 0.18 mm
shoulder 0.10 mm
waist: 0.07 mm
hip: 0.09 mm
ext.: 0.06 mm

Translators

length: 0.13 mm
depth: 0.05 mm

Caudicle

diam.: 0.06 mm

Translator/caudicle type: fb/cw

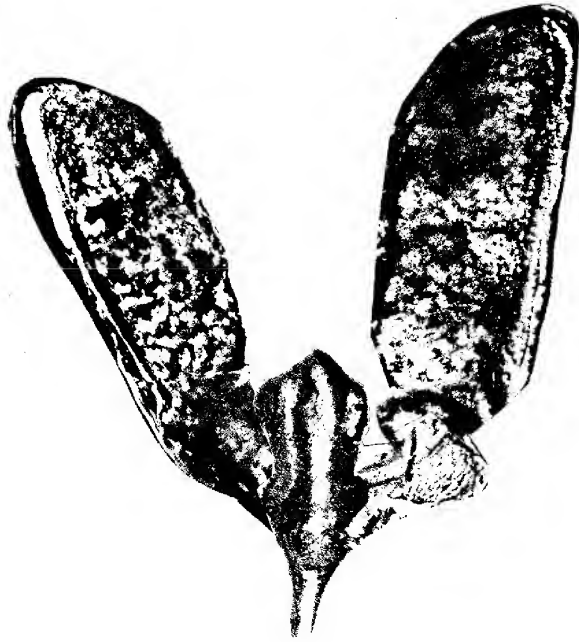
Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: S

Hoya tsangii Burton 1988

Pollinarium from **Type** Elmer #13372
collected from Cabadbaran, 1000' elevation, Mt. Bulusan
Sorsogon Prov. Luzon, Philippines (1916).



Magnified approximately
165x.

Pollinium

length: 0.34 mm
widest: 0.13 mm

Retinaculum

length: 0.18 mm
shoulder 0.10 mm
waist: 0.07 mm
hip: 0.09 mm
ext.: 0.06 mm

Translators

length: 0.13 mm
depth: 0.05 mm

Caudicle

diam.: 0.06 mm

Translator/caudicle type: fb/cw

Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: S

Hoya krohniana Kloppenburg & Siar 2009



Pollinarium enlarged about 165x.

Pollinium

length	0.34 mm.
widest	0.13 mm.

Retinaculum

length	0.09 mm.
shoulder	0.04 mm.
waist	0.02 mm.
hips	0.03 mm.
ext.	0.02 mm.

Translator

length	0.19 mm.
widest	0.035 mm.
depth	0.01 + mm.

Caudicle bulb is elongate D shaped

length of bulb	0.10 mm.
widest	0.07 mm.

The translators are very long extending beyond the pollinia apex and the caudicle bulbs. Bulb portion of the caudicles lay on the translators are long and bulbous with long extensions entering the retinacula sides.

Translator/caudicle: lb/cw

Caudicles: C

Pollinia inner ends: T

Retinacula: E

Hoya nummularioides Costantin 1912

Pink clone

Pollinarium enlarged about 165x. This is the pink clone. See Pollinaria book for comparisons and details.



Pollinia

length	0.34 mm
widest	0.12 mm

Retinaculum

length	0.15 mm
shoulder	0.09 mm
waist	0.60 mm
hip	0.08 mm
extensions	0.05 mm

Translator

length	0.01 mm
depth	0.02 mm

Caudicle

bulb diameter	0.05 mm
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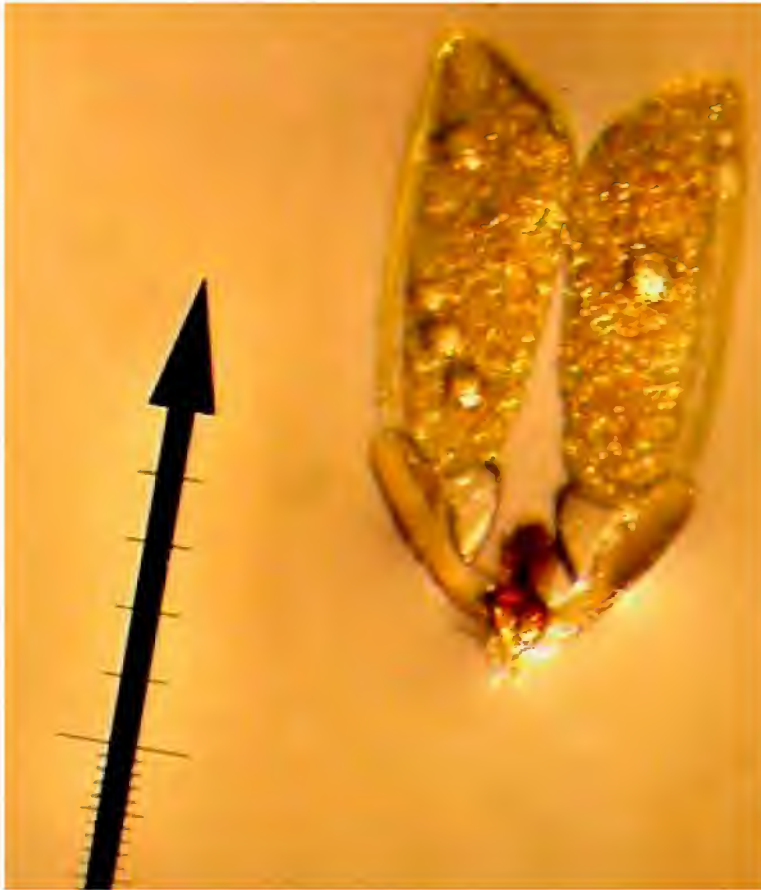
Translator/caudicle type: fb/cw

Pollinia apex type: F

Caudicle bulb: ?

Retinacula character: R

Hoya krophniana subsp. lalawinanensis Kloppenburg & Mendoza
(unpublished) GM #151



Pollinarium enlarged 170x.

Pollinium

length	0.33 mm
widest	0.14 mm

Retinaculum

length	0.08 mm
shoulder	0.06 mm
waist	0.03 mm
hip	0.06 mm
ext.	0.03 mm

Translator

length	0.17 mm
wide	0.04 mm

Caudicle

bulb dorsal	0.05 mm
bulb depth	0.06 mm

Translator/caudicle type:
fb/cw

Pollinia apex type: TF

Caudicle bulb: C

Retinacula character: S

Hoya apoensis Kloppenburg & Siar 2010 Type clone



Pollinarium enlarged about 165x.

Pollinia

length	0.32 mm
widest	0.16 mm

Retinaculum

length	0.08 mm
shoulder	0.06 mm
waist	0.05 mm
hip	0.05 mm
extensions	0.04 mm

Translators

length	0.13 mm
depth	0.04 mm
wide top	0.01 mm

Caudicle bulb top 0.09 mm

Type: G

Caudicle has broad cupped top, below resting on translator top.

Ratios: ret./poll length 4.0; poll l/w = 2.0

Translator/caudicle type: fb/cw

Pollinia apex type: T

Retinacula character: S

Hoya odetteae Kloppenburg 1998

Type flower from Ted Green, Kaaawa, HI.



The complexities of the pollinarium are not always easy to capture with a photomicrograph.

Note: The broad structure and conformation of the dark retinaculum and where the translators and caudicles are apparently attached. The translators have rounded extended apices, the caudicles here are relatively small by comparison. The pollinia are full with rounded ends.

and the above picture show the pollinarium enlarged approx. 165 times. I show this second picture because on the lower left side the ballooned, rounded translator is better depicted as it lends support to the more amber clear caudicle to which the inner end of the pollinia adheres. It also shows that the translator and caudicle are attached well down on the side (at the hip or below) of the retinaculum.



Pollinia

length	0.32 mm
widest	0.12 mm

Retinaculum

length	0.09 mm
shoulder	0.08 mm
waist	0.07 mm
hip	0.08 mm
extensions	0.06 mm

Translators

length	0.12 mm
depth	0.05 mm

Caudicle

bulb diam.	0.04 mm
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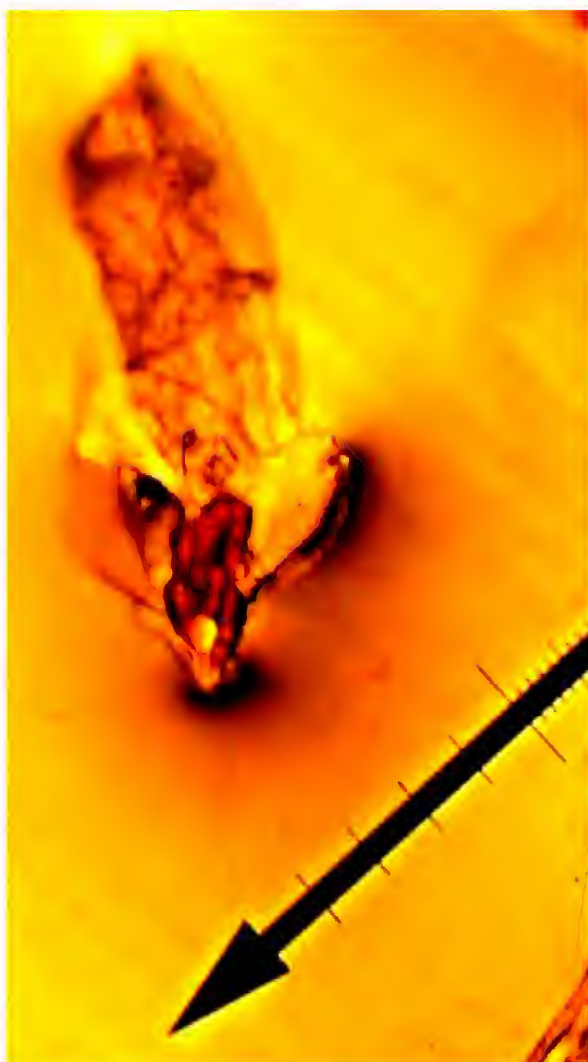
Retinacula character: S

Translator/caudicle Type: fb/cw

Pollinia inner apex type: T

Caudicle bulb: G

Hoya taywanisensis Kloppenburg & Mendoza
(unpublished) GM #172



Pollinarium enlarges 180x.

Pollinium

length	0.32 mm
widest	0.12 mm

Retinaculum

length	0.09 mm
shoulder	0.10 mm
waist	0.05 mm
hip	0.07 mm
ext	0.05 mm

Translator

length	0.13 mm
widest	0.05 mm

Caudicle **0.06 mm**

Translator/caudicle type: fb/cw

Pollinia inner apex type: F

Caudicle bulb: C

Retinacula character: S

Hoya pseudoleyensis Kloppenburg, Mendoza, Guevarra &
Carandang 2013



Pollinarium enlarged ca.
140x.

Pollinium

length	0.32 mm
widest	0.15 mm

Retinaculum

length	0.05 mm
shoulder	0.08 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.04 mm

Translator

length	0.15 mm
depth	0.04 mm

Caudicle

bulb diam. 0.06 mm

Translator/caudicle

Type: fb/cw

Pollinia inner apex type:
T

Caudicle bulb: G

Retinacula character: S

Hoya acanthocitrina Kloppenburg & Mendoza
(unpublished) GM #102



Pollinarium enlarged ca.
170x

Pollinium

length 0.32 mm
widest 0.12 mm

Retinaculum

length 0.08 mm
shoulder 0.08 mm
waist 0.05 mm
hip 0.07 mm
ext. 0.05 mm

Translator

length 0.16 mm
depth 0.05 mm

Caudicle

bulb diam. 0.04 mm

Translator/caudicle type:
fb/o

Pollinia inner apex type:
T

Caudicle bulb: C

Retinacula character: S

Hoya capatata Kloppenburg & Mendoza
(unpublished) GM #81



Pollinarium enlarged Upper left. 130x, right 110x and lower left 100x.



The pollinarium seemed to be a little deformed my best judgment as to the measurements is:

Pollinium

length 0.32 mm
widest 0.12 mm

Retinaculum

length 0.09 mm
shoulder 0.08 mm
waist 0.06 mm
ext 0.03 mm

Translator

length 0.11 mm
width 0.02 mm

Caudicle

a cw type ca. 0.07 mm across the top

Translators appear to be l/cw
Caudicle bulb: C

Pollinia inner end type: T
Retinacula: S

Hoya biespada Kloppenburg & Mendoza 2015
GM #17



Pollinarium above enlarged ca. 180x.

Pollinium

length	0.31 mm
widest	0.13 mm

Translator

length	0.15 mm
depth	0.04 mm

Caudicle

bulb diam.	0.05 mm
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Retinaculum

length	0.07 mm
shoulder	0.06 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.03mm

Translator/caudicle type: fb/o

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: HU

Hoya sp. Lisa V2

Via Torill Nyhuus March 2003 as flower cluster in alcohol thought to be close to *Hoya sipitangensis*. 8/30/03



Pollinarium enlarged about 165x. Pollinia are sharply truncated inward at the inner apices. Translators are extended and somewhat expanded at outer extremities. Caudicle are clear bulbous, and attached at the waste area of the retinaculum. The pollinarium is very small.

Pollinium

length	0.31 mm
widest	0.11 mm

Retinaculum

length	0.16 mm
shoulders	0.05 mm
waist	0.02 mm
hips	0.06 mm
extensions	0.05 mm.
	not well defined

Translators

length	0.16 mm
widest	0.05 mm

Caudicle

bulb diam.	0.08 mm
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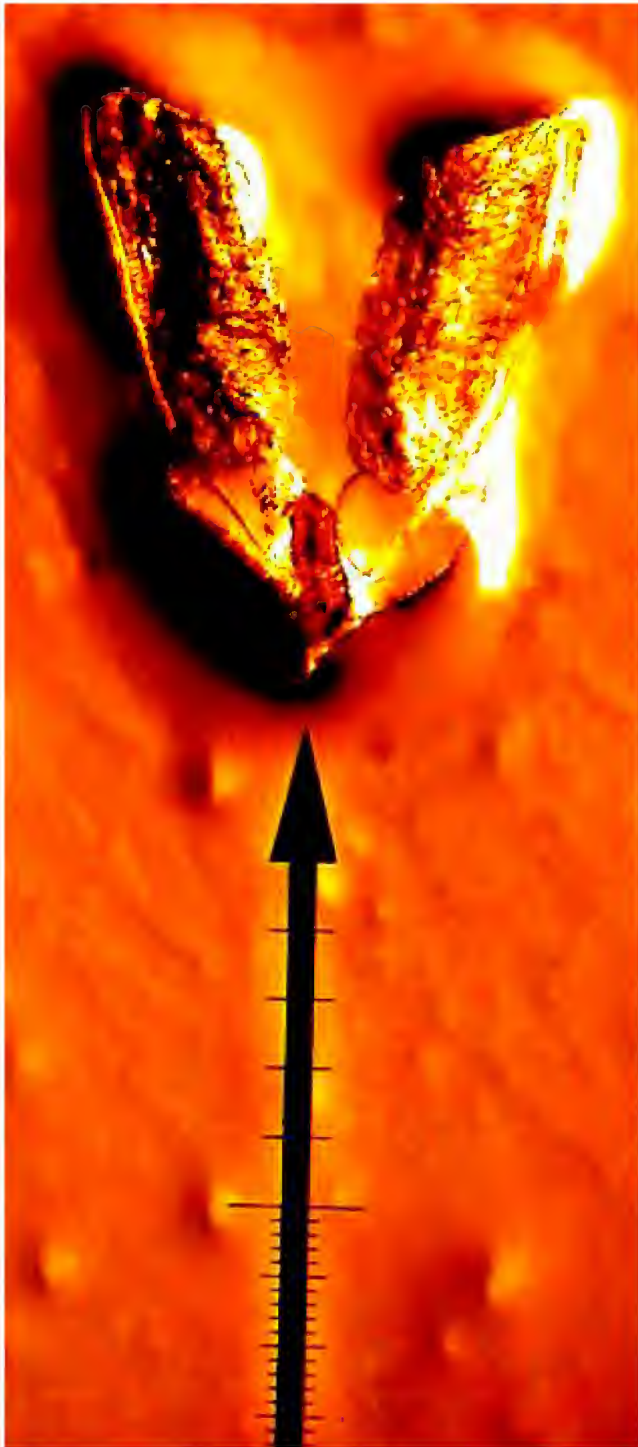
Translator/caudicle type fb/o

Pollinia inner end type: F

Caudicle bulb: G

Retinacula character: S

Hoya realensis Kloppenburg & Mendoza
(unpublished) GM #67



Pollinarium (left) enlarged ca. 220x

Pollinium

length 0.31 mm
widest 0.11 mm

Retinaculum

length 0.11 mm
shoulder 0.04 mm
waist 0.03 mm
hip 0.04 mm
ext. 0.03 mm

Translator

length 0.17 mm
widest 0.04 mm

Caudicle

bulb diam. 0.06x 0.05 mm

Translator/caudicle type: fb/cw

Pollinia end type: F

Caudicle bulb: C

Retinacula character: E

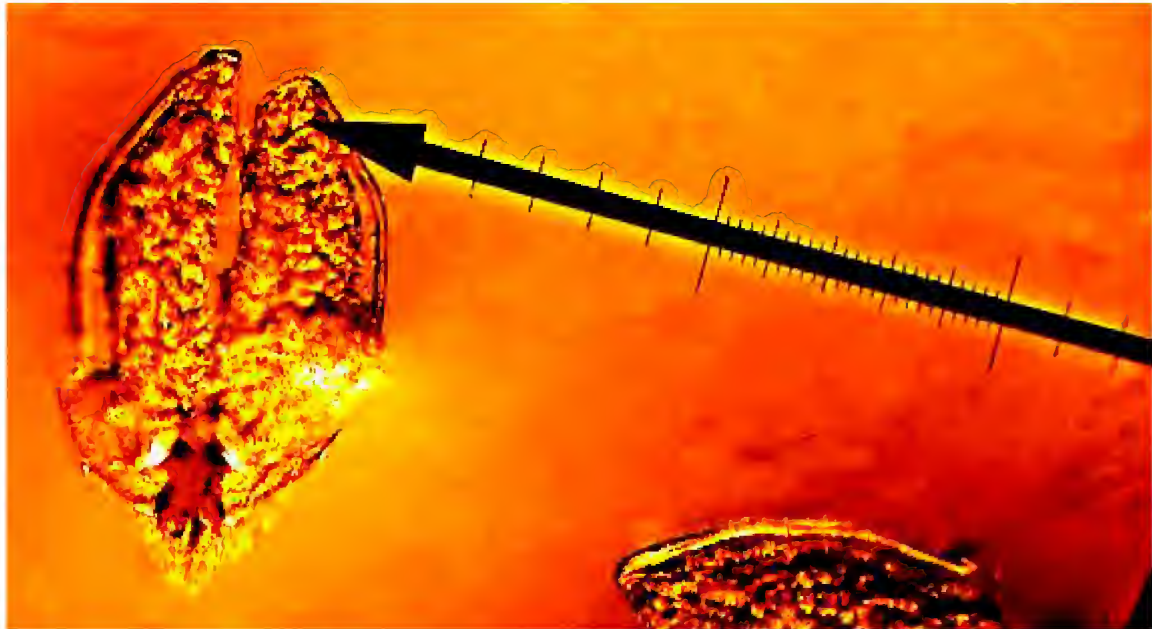
Pollinia Types 2017-2b

fb/cw. l/cw. fb/o

83. *Hoya tangerina* Kloppenburg, Mendoza & Ferreras 2014
84. *Hoya heuschkeliana* Kloppenburg 1989
85. *Hoya memoria* Kloppenburg 2004
86. *Hoya walliniana* Kloppenburg & Nyhuus 2003
87. *Hoya bifunda* subsp. *integra* Klopp., Siar, Cajano, Guevarra & Carandang 2013
88. *Hoya* sp. IML 232 Kuching Sarawak, Borneo
89. *Hoya pallilimba* Kleijn & van Donkelaar 1999
90. *Hoya* sp. IPPS 8870
91. *Hoya nabawanensis* Kloppenburg & Wiberg 2002
92. *Hoya hirsuta* Kloppenburg & Mendoza 2015
93. *Hoya* sp. TG Bada, C. Sulawesi
94. *Hoya celsa* Kloppenburg, Siar, Guevarra, Cajano & Carandang 2013
95. *Hoya rosarioae* Kloppenburg & Siar 2010
96. *Hoya* sp. F 484 Kuching Borneo
97. *Hoya* sp. TN99-002 From Torill Nyhuus, Sweden
98. *Hoya unica* Kloppenburg, Mendoza & Ferreras 2013
99. *Hoya unica* subsp. *aurantiaca* Kloppenburg & Mendoza
100. *Hoya nuevaensis* Kloppenburg & Mendoza
101. *Hoya revoluta* Wight 1883
102. *Hoya yapiana* Kloppenburg 2010
103. *Hoya* sp. IPPS 1779
104. *Hoya aurea* Kloppenburg & Mendoza
105. *Hoya leticiae* Kloppenburg, Cajano & Hadsall 2015
106. *Hoya marvinii* Kloppenburg, Mendoza & Ferreras 2013
107. *Hoya acanthodissimila* Kloppenburg, Cajano & Barcelona 2015
108. *Hoya acanthominima* Kloppenburg, Mendoza & Ferreras 2013
109. *Hoya taeahwa* subsp. *tayuncisensis* Kloppenburg & Mendoza
110. *Hoya nagcarlanensis* Kloppenburg, Mendoza
111. *Hoya taeahwa* Kloppenburg & Mendoza
112. *Hoya taeahwa* subsp. *tayuncisensis* Kloppenburg & Mendoza
113. *Hoya nagcarlanensis* Kloppenburg, Mendoza
114. *Hoya caespitosa* Kloppenburg & Mendoza
115. *Hoya bulba* Kloppenburg & Mendoza
116. *Hoya liquida* Kloppenburg & Mendoza
117. *Hoya linguiforma* Kloppenburg & Mendoza
118. *Hoya acanthopenta* Kloppenburg & Mendoza
119. *Hoya cupula* Kloppenburg, Mendoza & Ferreras 2013
120. *Hoya rosarioae* subsp. *realensis* Kloppenburg & Mendoza
121. *Hoya leytensis* Elmer ex Burton
122. *Hoya unica* subsp. *bakerensis* Kloppenburg & Mendoza
123. *Hoya pubacupula* Kloppenburg Mendoza
124. *Hoya picta* Miquel 1856
125. *Hoya bilobata* Schlechter 1908

- 126. **Hoya amorosoae** T. Green & Kloppenburg 2014
- 127. **Hoya sp. DS #1**
- 128. **Hoya brittonii** Kloppenburg, 1992
- 129. **Hoya reyesii** Medina & Kloppenburg 2016

Hoya tangerina Kloppenburg, Mendoza & Ferreras 2014



Pollinarium enlarged ca. 160x.

Pollinium

length	0.31 mm
widest	0.13 mm

Retinaculum

length	0.06 mm
shoulder	0.06 mm
waist	0.04mm
hip	0.06 mm
ext.	0.04 mm

Translator

length	0.13 mm
depth	0.03 mm

Caudicle

top cup	0.07 mm
length	0.07 mm

Translator/caudicle type: fb/cw

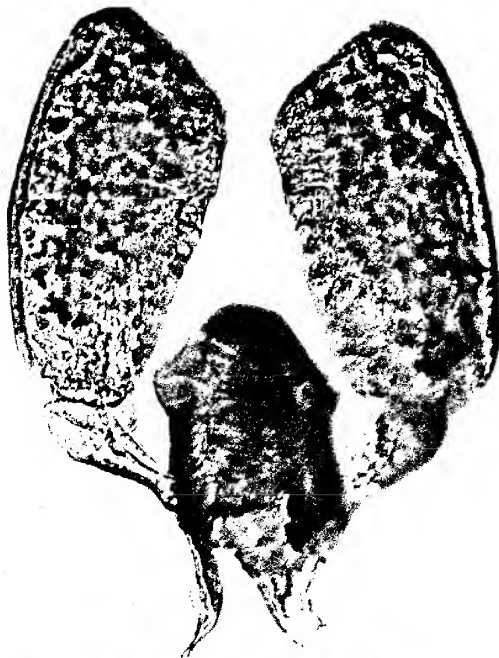
Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: S

Hoya heuschkeliana Kloppenburg 1989

Pollinarium from **Type** clone (CAHUP) collected by Professor
Juan V. Pancho at the north portion of Lake Bulusan,
Sorsogon Prov., Luzon, Philippines.



Pollinium

length: 0.30 mm
widest: 0.15 mm

Retinaculum

length: 0.15 mm
shoulder: 0.15 mm
waist: 0.13 mm
hip: 0.13 mm
ext.: 0.13 mm

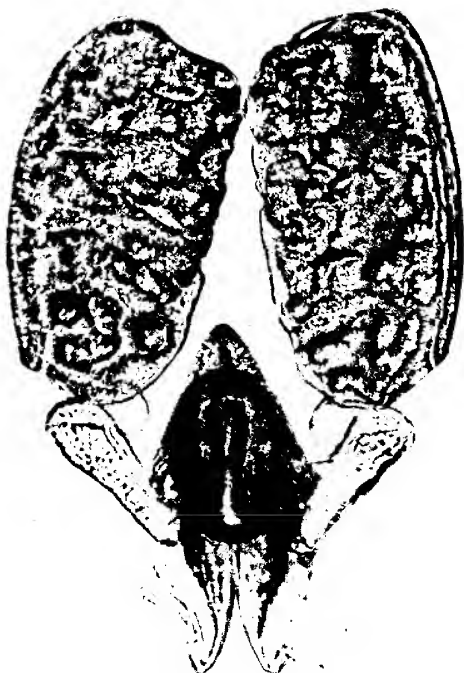
Translators

length: 0.12 mm
depth: 0.05 mm

Caudicle

bulb diam.: 0.05 mm

Magnified approximately 165x.



Pollinium

length: 0.30 mm
widest: 0.16 mm

Retinaculum

length: 0.17 mm
shoulder: 0.11 mm
waist: 0.12 mm
hip: 0.10 mm
ext.: 0.11 mm

Translators

length: 0.13 mm
depth: 0.05 mm

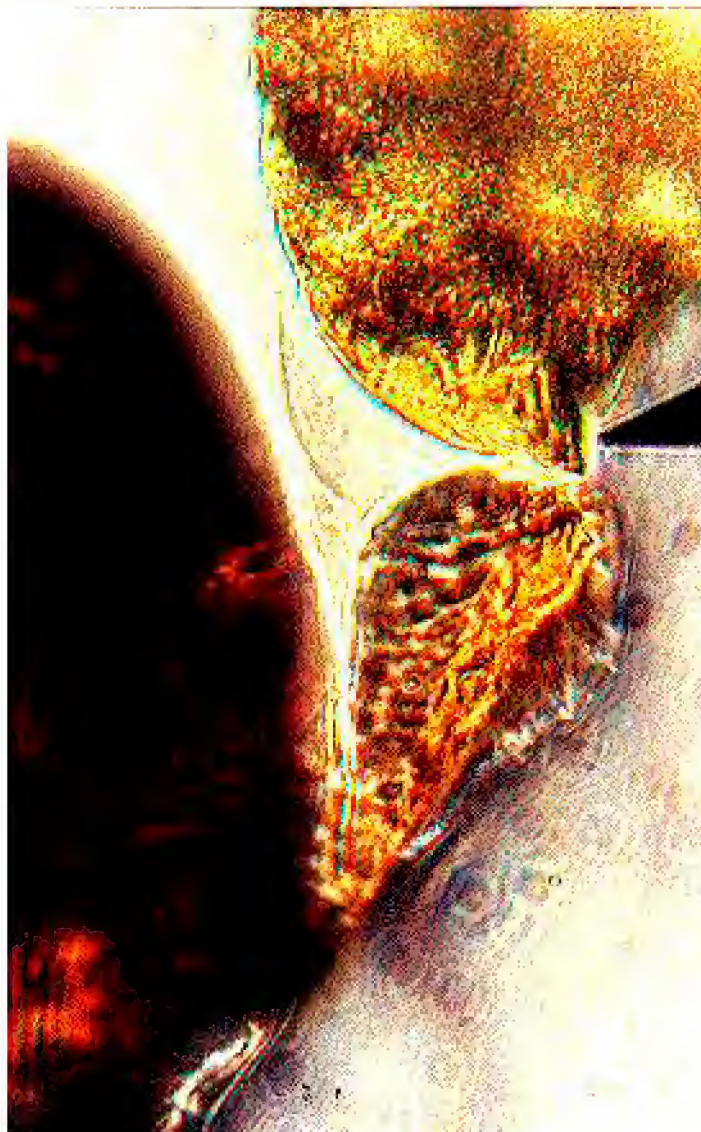
Caudicle

bulb diam.: 0.05 mm

This is the yellow flower form of this species that opens campanulate, and thus shows some genetic difference. Same magnification.



Pollinarium enlarged about 165x. This is a relatively small pollinarium with many distinctive and individualistic features. The pollinia are short and broad with apices truncated, the translators are long and wide on the top supporting a clear caudicle. Here you can note the distinctive "pollywog" like shape of the caudicles, a bulbous end into which the ends of the pollinia adhere and a narrow tail extending into the Retinacula. The retinacula is broad with widely spaced extensions.



This is a very enlarged view of the area where the pollinia are attached (stuck might be a better term) into the clear caudicle and the supporting translator and the adjacent part of the dark retinacula. This has been enlarged about 660X. The translucent caudicle is so clear that it just casts a shadow over the apical area of the pollinia, it also casts a shadow on the broad top of the translator which is shaped like a wedge with the broad side on top supporting the tail of the caudicle and narrows as it approaches the retinaculum.

Translator/caudicle type: f/o

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: R

Hoya memoria Kloppenburg 2004
Type clone, pollinarium from flower of clone Philip. 3.



Pollinarium enlarged about 165x. The retinaculum of this species is relatively small but here the translators by contrast are large. This is a small pollinarium.

Pollinia

length	0.30 mm
widest	0.11 mm

Retinaculum

length	0.05 mm without the extensions.
shoulder	0.05 mm
waist	0.04 mm
hip	0.05 mm +
extensions	0.04 mm strong, well formed

Translator

length	0.12 mm
deepest	0.04 mm
wide	0.02 mm

Caudicle bulb diameter 0.06 mm. tear drop shaped.

Type: clear

Translator/caudicle type: fb/cw

Pollinia inner end type: F

Caudicle bulb: C

Retinacula character: S

Hoya walliniana Kloppenburg & Nyhuus 2003 Type clone



A pollinarium enlarged about 165x. The pollinia are inwardly truncate on the inner apex. The translators are long and narrow with large clear caudicles. The appears to have a bifid head but I believe it is the viewing angle. Well developed head and waste, extensions are tight together and not well developed.

Pollinia

Length	0.30 mm
Widest	0.13 mm

Retinaculum

Length	0.10 mm
Shoulders	0.04 mm
Waist	0.02 mm
Hip	0.06 mm
Extensions	0.05 mm

Translators

Length	0.15 mm
Wide	0.02 mm

Caudicle bulb. 0.10 x 0.05 mm

Type: C

Translator/caudicle type: l/o

Pollinia inner end type: F

Caudicle bulb: C

Retinacula character: S



Another photomicrograph of the Pollinarium to show the unusual arm formations in the head area of the retinaculum the unusual leg formations below the waist and long and lightly differentiated (extensions).

Hoya bifunda subsp. integra Kloppenburg, Siar, Cajano, Guevarra
& Carandang 2013 Type clone



Pollinarium enlarged
ca. 270x.

Pollinium

length 0.29 mm
widest 0.14 mm

Retinaculum

length 0.06 mm
shoulder 0.09 mm
waist 0.06 mm
hip 0.07 mm
ext. 0.04 mm

Translator

length 0.07 mm
depth 0.01 mm

Caudicle

bulb. diam. 0.07 mm

Type: C

Ratios:

p/r 4.8
p/w 2.1

Translator/caudicle

type: l/o

Pollinia inner end

type: R

Caudicle bulb: G ?

Retinacula character: S

Hoya sp. IML 232 Kuching Sarawak, Borneo

Collector Peter Tsang; flower via Ann Wayman.



Magnified approximately 165x.

Pollinium

length: 0.29 mm
widest: 0.12 mm

Retinaculum

length: 0.06 mm
shoulder: 0.05 mm
waist: 0.02 mm
hip: 0.04 mm
ext.: 0.03 mm

Translators

length: 0.17 mm
depth: 0.04 mm

Caudicle

bulb diam.: 0.07 mm

Translator/caudicle type: fb/cw

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: S

Hoya pallilimba Kleijn & van Donkelaar 1999

From **Type** clone.



Pollinarium enlarged about 165x.

Pollinia

length	0.29 mm
widest	0.12 mm

Retinaculum

length	0.08 mm to the extensions
shoulder	0.05 mm
hip	0.04 mm
waist	0.05 mm
extensions	0.04 mm

Translator

length	0.14 mm
widest	0.04 mm

Caudicle

bulb diameter	0.06 mm
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Translator/caudicle type: fb/cw

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: LS

Hoya pallilimba Kleijn & van Donkelaar 1999

From **Type** clone.



Pollinarium enlarged about 165x.

Pollinia

length	0.29 mm
widest	0.12 mm

Retinaculum

length	0.08 mm to the extensions
shoulder	0.05 mm
hip	0.04 mm
waist	0.05 mm
extensions	0.04 mm

Translator

length	0.14 mm
widest	0.04 mm

Caudicle

bulb diameter	0.06 mm
---------------	---------

Translator/caudicle type: fb/cw

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: LS

Hoya sp. IPPS 8870

Via Torill Nyhuus, March 2007. flowers in Kew solution, data 4/1/07



Pollinarium enlarged about 85x. Pellucid edge does not extend all the way down side, but continues over the inner pollinia apex.

Pollinium

length	0.29 mm
widest	0.11 mm

Retinaculum

length	0.07 mm
shoulder	0.08 mm
waist	0.05 mm
hip	0.06 mm
ext.	0.03 mm

Translator

length	0.10 mm
depth	0.02 mm

Caudicle

bulb diam.	0.04 mm
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Translator/caudicle type: l/cw **Pollinia inner end type:** R **Caudicle bulb:** C
Retinacula character: HU

Hoya nabawanensis Kloppenburg & Wiberg 2002

A new species from Borneo 2002

Material from **Type** clone.



Pollinarium enlarged about 165x. Pollinia are wide, translators long and distinctive and the retinaculum short.

Pollinia

length	0.28 mm
widest	0.12 mm

Retinaculum

length	0.17 mm
head	rounded with no distinct shoulder.
waist	0.02 mm ca.
hips	0.04 mm
extensions	up to 0.03 mm

Translator

length	0.15 mm
widest	0.13 mm

Caudicle

bulb diameter	0.05 mm ca.
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Translator/caudicle type: fb/cw **Pollinia end type:** T **Caudicle bulb:** C

Retinacula character: LS

Hoya hirsuta Kloppenburg & Mendoza 2015



Pollinarium enlarged ca. 150x.

Pollinium:

length	0.27 mm
widest	0.11 mm

Retinaculum:

length	0.06 mm
shoulder	0.03 mm
waist	0.01 mm
hip	0.03 mm
ext.	0.03 mm

Translators:

length	0.14 mm
widest	0.03 mm

Caudicle:

oval	0.04 x 0.06 mm
------	----------------

Type: C (clear)

Translator/caudicle type: fb/cw.

Pollinia end type: T

Retinacula type: LS (long shoulders)

Hoya sp. TG Bada, C. Sulawesi
via mail 6/14/06 with stem, peduncle and flowers



Pollinarium enlarged. Note reticle arrow is 0.1 mm. long and base 0.05 mm. wide.

Pollinium

length	0.27 mm
widest	0.11 mm

Retinaculum

length	0.06 mm
shoulders	0.06 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.04 mm

Translators

length	0.11 mm
widest	0.04 mm

Caudicle

bulb diam.	0.07 mm
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Translator/caudicle type: fb/cw.

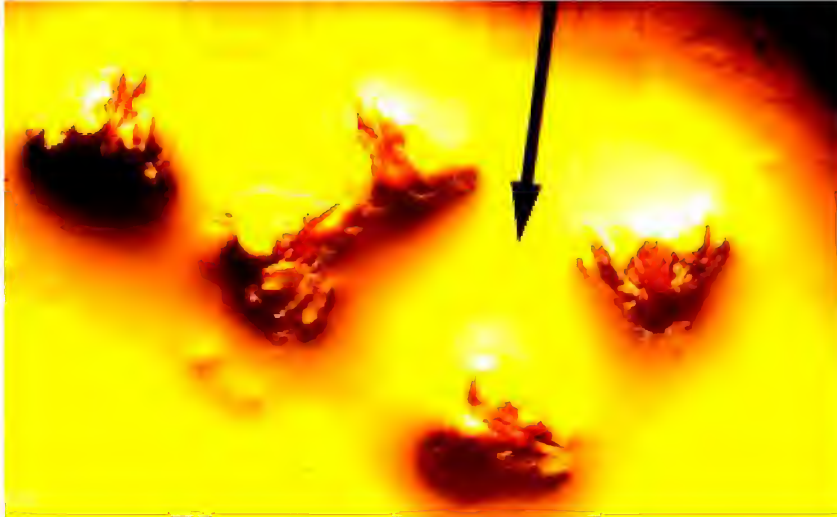
Pollinia end type: F

Caudicle bulb: G ?

Retinacula character: S

Note the clavate end of the pollinium. the long rather wide translators (fiddle shaped) and small wide retinaculum.

Hoya celsa Kloppenburg, Siar, Guevarra, Cajano & Carandang 2013



None of the pollinia were attached to the retinacula. The translators are typical of the Section Acanthostemma.

Retinaculum

length	0.12 mm
shoulder	0.09 mm
waist	0.06 mm
hip	0.09 mm
ext.	0.09 mm



Translator

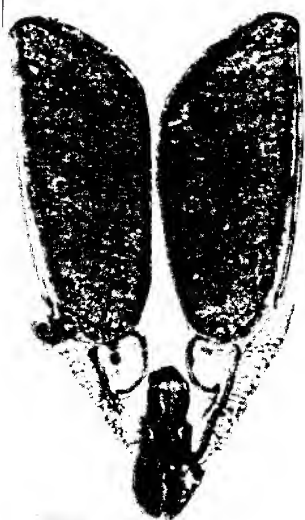
length	0.18 mm
depth	0.05 mm

Translator/caudicle type: fb/cw

In the top of this photo is the anther with pollinia (2) it is difficult to determine the precise measurements but here is my best estimate.

length	0.26 mm
widest	0.10 mm

Hoya rosarioae Kloppenburg & Siar 2010 Type clone
obscura Elmer ex Burton 1986
var. longipedunculata
Flowered at Fresno, CA. USA.



Magnified approximately 165x.

Pollinium

length: 0.26 mm
widest: 0.07 mm

Retinaculum

length: 0.11 mm
shoulder: 0.04 mm
waist: 0.03 mm
hip: 0.05 mm
ext.: 0.02 mm

Translators

length: 0.16 mm
depth: 0.02 mm

Caudicle

bulb diam.: 0.04 mm

Translator/caudicle type: fb/o

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: LS ?

Hoya sp. F 484 Kuching Borneo



A poor photo of the pollinarium enlarged about 85 times. From other date:

Pollinia

length	0.26 mm.
widest	0.14 mm

Retinaculum

length	0.07 mm.
shoulder	0.04 mm.
waist	0.03 mm.
hip	0.05 mm.
ext	0.03 mm.

Translators

length	0.14 mm.
depth	0.04 mm.

Caudicle

bulb diam.	0.03 mm.
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Translator/caudicle type: fb/cw

Pollinia inner end type: F

Caudicle bulb: ?

Hoya sp. TN99-002 From Torill Nyhuus, Sweden

via Nathalie Simonsson. Photos 3/25/05 Roll 328

Pollinarium with Olympus microscope. Pollinium are broad with rounded-truncate inner apices. Caudicles are clear supported by relatively heavy translators. Retinaculum is of proportional size with rounded head.



Pollinarium
enlarged about 165x.

Pollinium

length	0.26 mm
widest	0.12 mm

Retinaculum

length	0.08 mm
shoulder	0.05 mm
waist	0.03 mm
hip	0.04 mm
ext.	0.05 mm

Translators

length	0.09 mm
depth	0.03 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type: fb/cw

Pollinia inner end type: F

Caudicle bulb: C

Retinacula character: LS

Hoya unica Kloppenburg, Mendoza & Ferreras 2013
ISSN 1055-4564



Pollinarium enlarged ca, 240x.

Pollinium

length 0.26 mm
widest 0.10 mm

Retinaculum

length 0.05 mm
shoulder 0.04 mm
waist 0.03 mm
hip 0.04 mm
ext 0.02 mm

Translator

length 0.13 mm
widest 0.04 mm

Caudicle

Top 0.05 mm
Depth 0.07 mm

Type: C

Translator/caudicle Type:
fb/cw

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: LS

Hoya unica subsp. aurantiaca Kloppenburg & Mendoza
(unpublished) GM #88



Pollinarium enlarged ca.
230x.

Pollinium

length	0.26 mm
widest	0.10 mm

Retinaculum

length	0.06 mm
shoulder	0.03 mm
waist	0.02 mm
hip	0.03 mm
ext.	0.01 mm

Translator

length	0.13 mm
widest	0.03 mm

Caudicle

bulb top	0.04 mm
depth	0.07 mm

Type: C

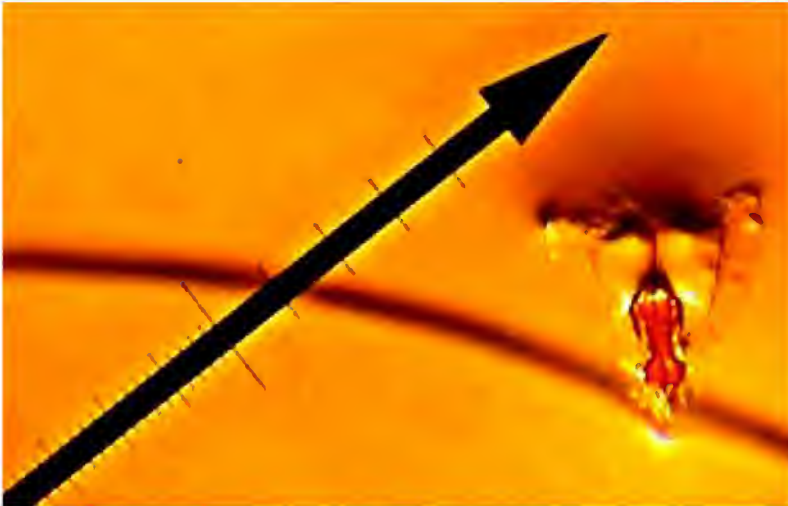
Translator/caudicle type:
fb/cw

Pollinia end type: T

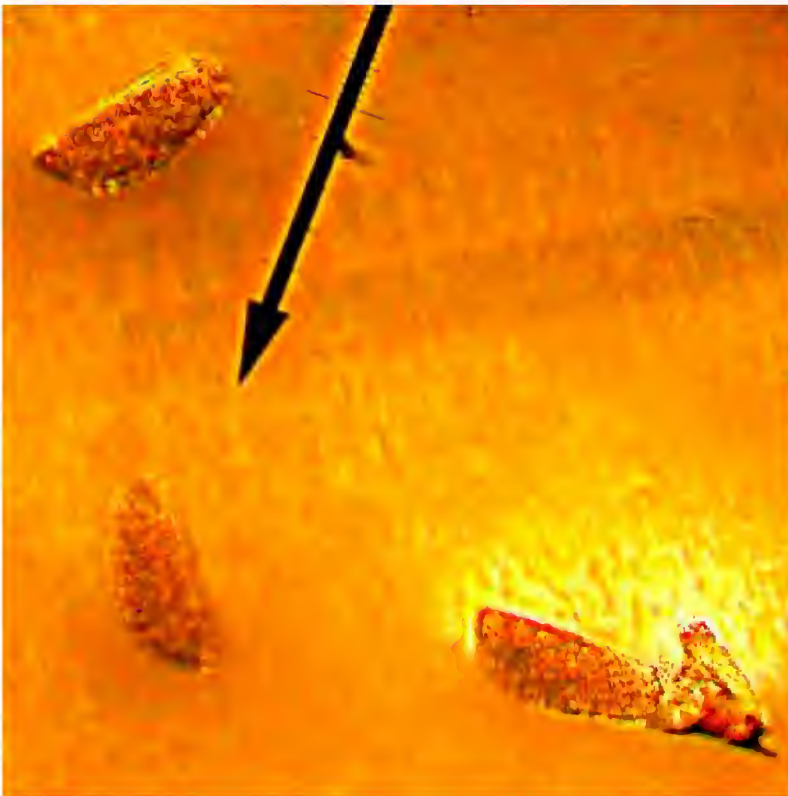
Caudicle bulb: C

Retinacula character: LS

Hoya nuevaensis Kloppenburg & Mendoza
(unpublished) GM #92



Retinaculum, translators and caudicle enlarged ca. 180x.



Two pollinium and a pollinarium lower right enlarged ca. 100x.

Pollinium

length	0.25 mm
widest	0.10 mm

Retinaculum

length	0.08 mm
shoulder	0.04 mm
waist	0.02 mm
hip	0.03 mm
ext.	0.01 mm

Translator "fb"

length	0.15 mm
wide	0.03 mm

Caudicle "cw"

top	0.05 mm
depth	0.06 mm

Pollinia end type: T

Caudicle bulb: C

Retinacula character: LS

Hoya revoluta Wight 1883



The pollinarium enlarged about 165x. The pollinia inner apices are truncated inwardly. The translators are long and with bulb-like outer apices. The clear caudicle is clearly defined. The retinaculum has a broad head and well developed extensions.

Pollinium

length	0.25 mm
widest	0.11 mm

Retinaculum

length	0.05 mm
shoulders	0.05 mm
hip	0.04 mm
waist	0.05 mm
ext.	0.04 mm

Translators

length	0.11 mm
widest	0.04 mm

Caudicle

bulb diam.	0.05 mm
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Type: C

Translator/caudicle type: fb/o

Pollinia apex type: F

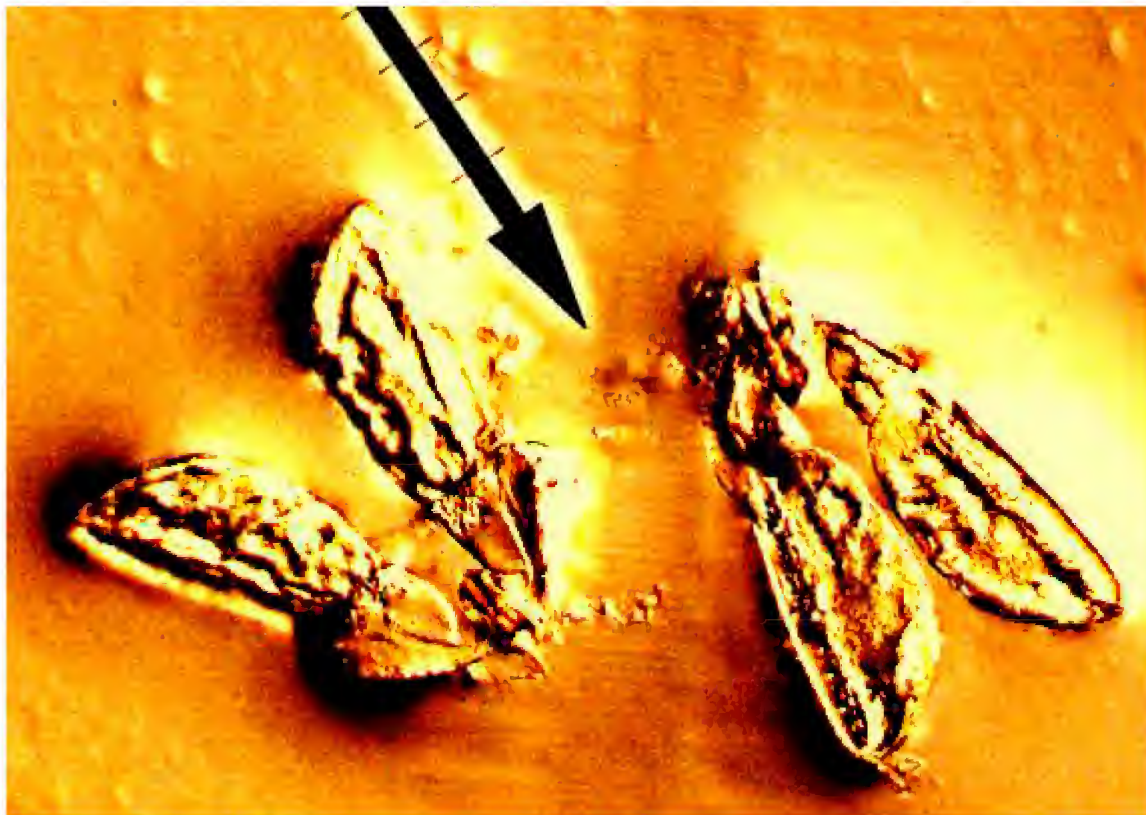


Caudicle bulb: C

Retinacula character: S

Pollinarium greatly enlarged. One pollinia missing. Each fine line in the background scale represents 1/100 of a millimeter.

Hoya yapiana Kloppenburg 2010
Type clone



Above two pollinaria the arrow on scale pointer is 0.1 mm. long

Pollinium

length 0.25 mm
widest 0.12 mm

Pollinia apex type: T

Translator/caudicle type: fb/cw

Retinaculum

length 0.06 mm (head to crotch)
shoulders 0.04 mm
waist 0.03 mm
hip 0.04 mm
ext 0.04 mm

Caudicle bulb: C

Retinacula character: LS

Translators

length 0.10 mm
widest 0.04 mm

Caudicle

Outer length 0.10 mm
Bulb at top 0.06 mm

In size this pollinarium is close to *Hoya revoluta* Wight but the outer lobe of the corona of our species is not divaricate. **Type: C**

Hoya sp. IPPS 1779

Flower from Ted Green, plant from Sumatra as *Hoya incurvula* Schlechter.



Pollinarium enlarged about 165x. The pollinia are angled so their true width is not revealed in this photo. This is a very small pollinarium.

Pollinia

length	0.25 mm
widest	0.10 mm

Retinaculum

length overall	0.07 mm
shoulders	0.05 mm
waist	0.03 mm
hips	0.04 mm
extensions	0.03 mm at least.

Translator

length	0.09 mm
width	0.03 mm relatively broad on top.
depth	0.04 mm almost bowl shaped.

Caudicle

bulb diam.	0.07 mm clear and relatively large.
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Caudicle bulb Type: granulate "G"

Translator/caudicle type: fb/o

Pollinia apex type: F

Retinacula character: S

Hoya aurea Kloppenburg & Mendoza
(unpublished) GM #11



Pollinarium
enlarged ca. 310x.

Pollinium

length 0.24 mm
widest 0.07 mm

Retinaculum

length 0.04 mm
shoulder 0.04 mm
hip 0.03 mm
waist 0.04 mm
ext. 0.02 mm

Translator

length 0.13 mm
depth 0.04 mm

Caudicle

bulb 0.04 mm

**Translator/
Caudicle Type:**
fb/cw

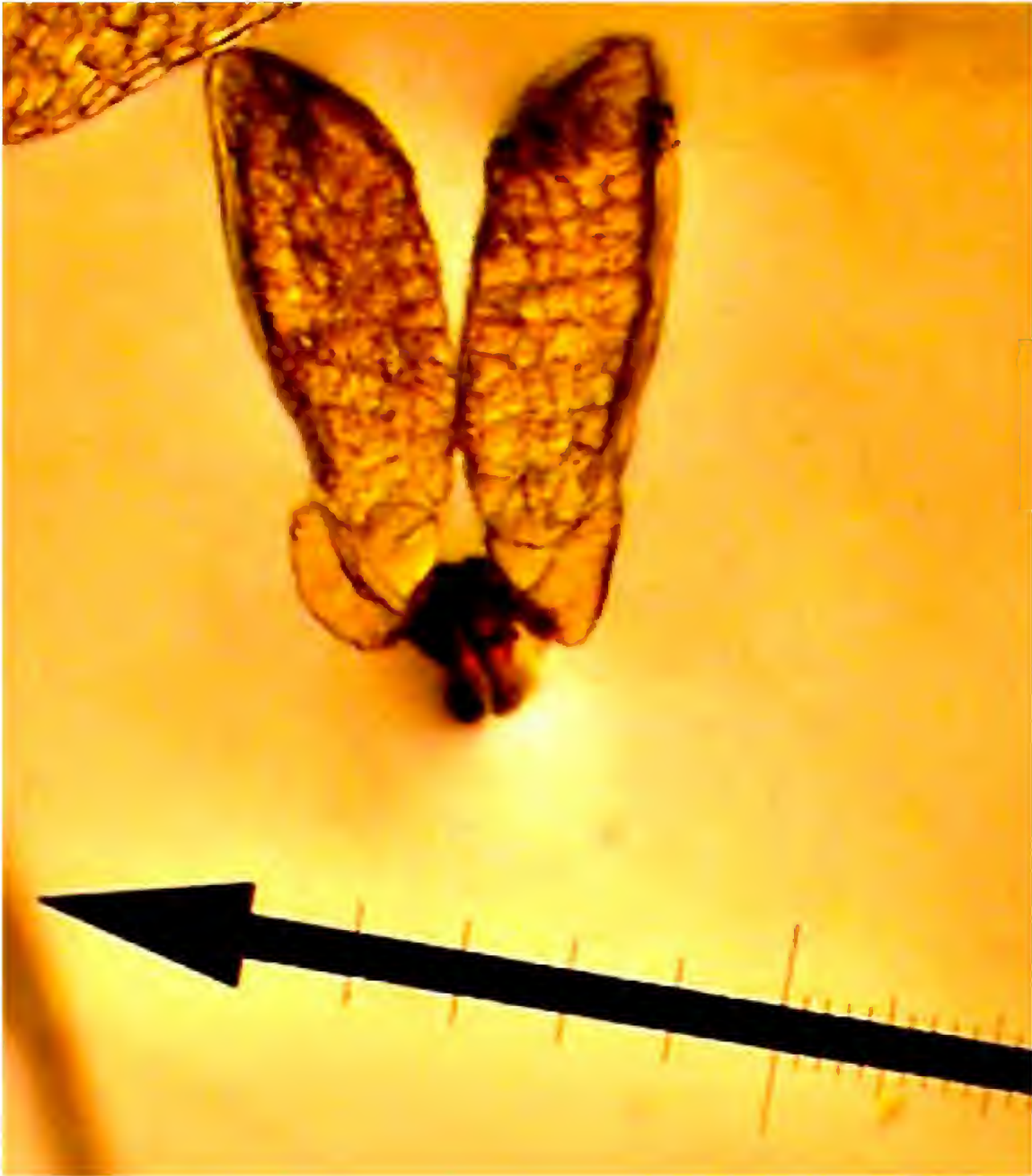
Ratios: p/w 3.4
p/r 6.0

**Pollinia inner end
type:** T

Caudicle bulb: G

Retinacula character: S

Hoya leticiae Kloppenburg, Cajano & Hadsall 2015



Pollinium enlarged ca. 320x.

Pollinium

length	0.24 mm
widest	0.10 mm

Translator

Retinaculum

length	0.04 mm
shoulder	0.12 mm
waist	0.08 mm
hip	0.09 mm

length 0.08 mm
widest 0.03 mm

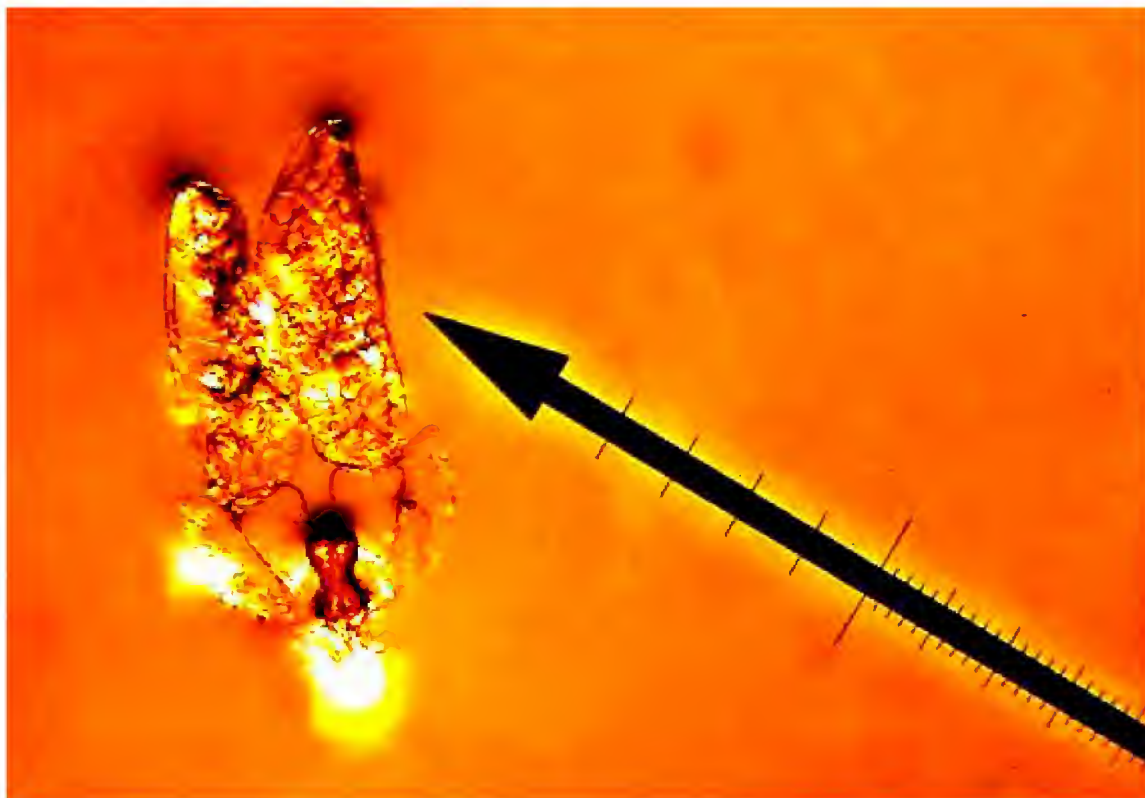
ext 0.03 mm
Caudicle
bulb. diam. 0.04 mm

Translator/caudicle type: fb/o

Bulb: C

Pollinia end type: T.....(tapered inward).

Hoya marvinii Kloppenburg, Mendoza & Ferreras 2013
ISSN 10055-4564



Pollinarium enlarged ca. 138x.

Pollinium

length	0.24 mm
widest	0.08 mm

Retinaculum

length	0.07 mm
shoulder	0.03 mm
waist	0.02 mm
hip	0.03 mm
ext.	0.02 mm

Translator

length	0.13 mm
widest	0.04 mm

Caudicle

bulb diam.	0.05 mm
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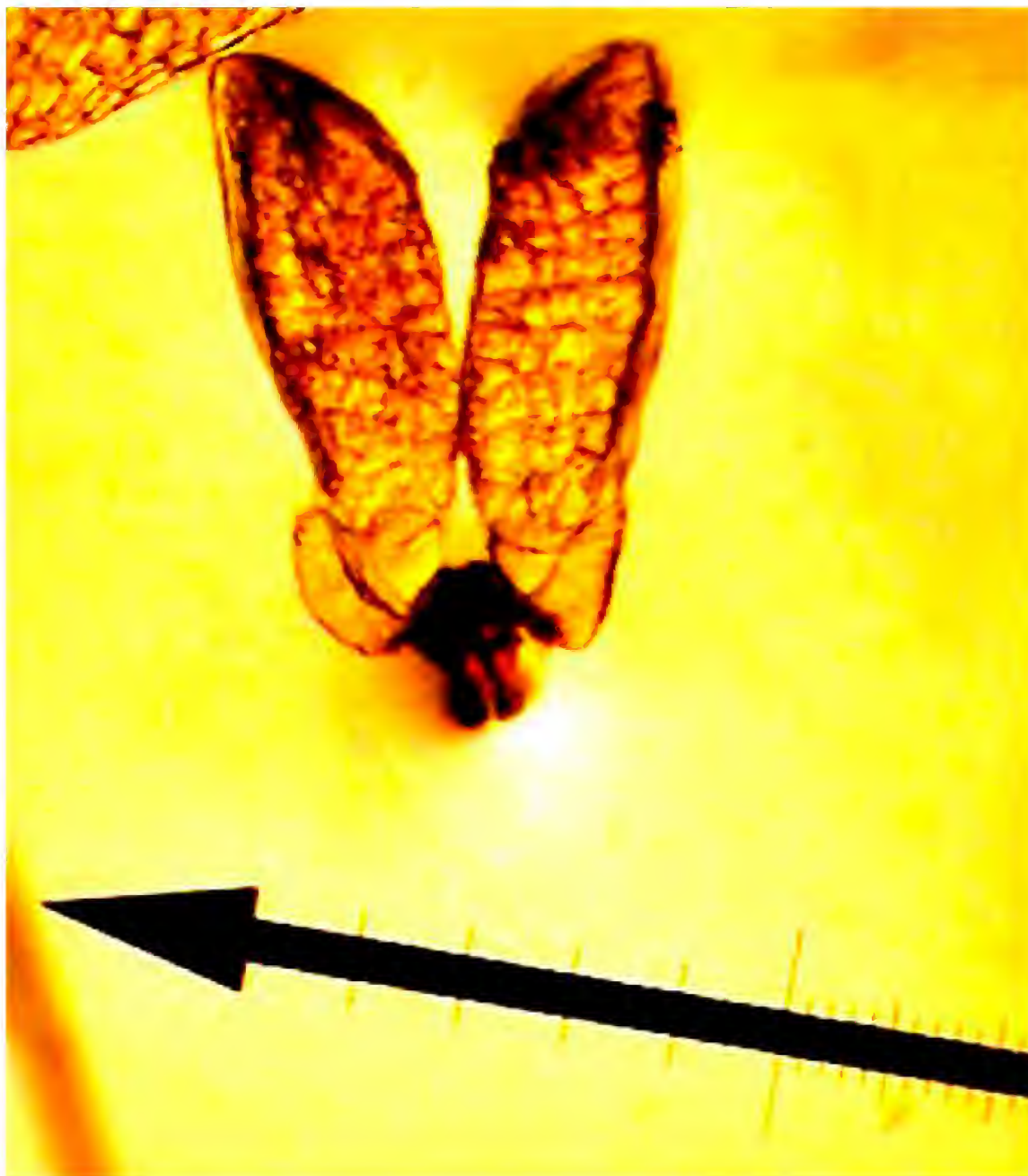
Caudicle bulb: C

Retinacula character: R

Translator/caudicle type: fb/cw

Pollinia inner end type: RF

Hoya acanthodissimila Kloppenburg, Cajano & Barcelona 2015
(unpublished)



Pollinium enlarged ca. 320x.

Pollinium

length	0.24 mm
widest	0.10 mm

Translator

length	0.08 mm
--------	---------

Retinaculum

length	0.04 mm
shoulder	0.12 mm
waist	0.08 mm
hip	0.09 mm
ext	0.03 mm

widest 0.03 mm

Caudicle

bulb. diam. 0.04 mm

Caudicle bulb type: clear

Translator/caudicle type: fb/o

Pollinia end type: T.....(tapered inward).

Caudicle bulb: C

Retinacula character: R

Hoya acanthominima Kloppenburg, Mendoza & Ferreras 2013
ISSN 10554564



Pollinarium enlarged ca. 110x,
very small and difficult to extract and
photograph.

Photo below shows the retinaculum better enlarged ca. 210x.



Pollinium

length 0.23 mm
widest 0.10 mm

Retinaculum

length 0.07 mm
shoulder 0.07 mm
waist 0.03 mm
hip 0.05 mm
ext 0.06 mm
overall length 0.13 mm

Translator

length 0.14 mm
depth 0.03 mm

Caudicle

bulb diam 0.05 mm

Translator/caudicle

Type: fb/cw

Pollinia inner end type: F

Retinacula character: S

Caudicle bulb: C ?

Hoya taeahwa Kloppenburg & Mendoza
(unpublished) GM #100



Pollinarium enlarged ca.
240x.

Pollinium

length 0.23 mm
widest 0.08 mm

Retinaculum

length 0.07 mm
shoulder 0.04 mm
waist 0.02 mm
hip 0.03 mm
ext. 0.01 mm

Translator

length 0.13 mm
depth 0.02 mm

Caudicle

bulb 0.05 x 0.06 mm

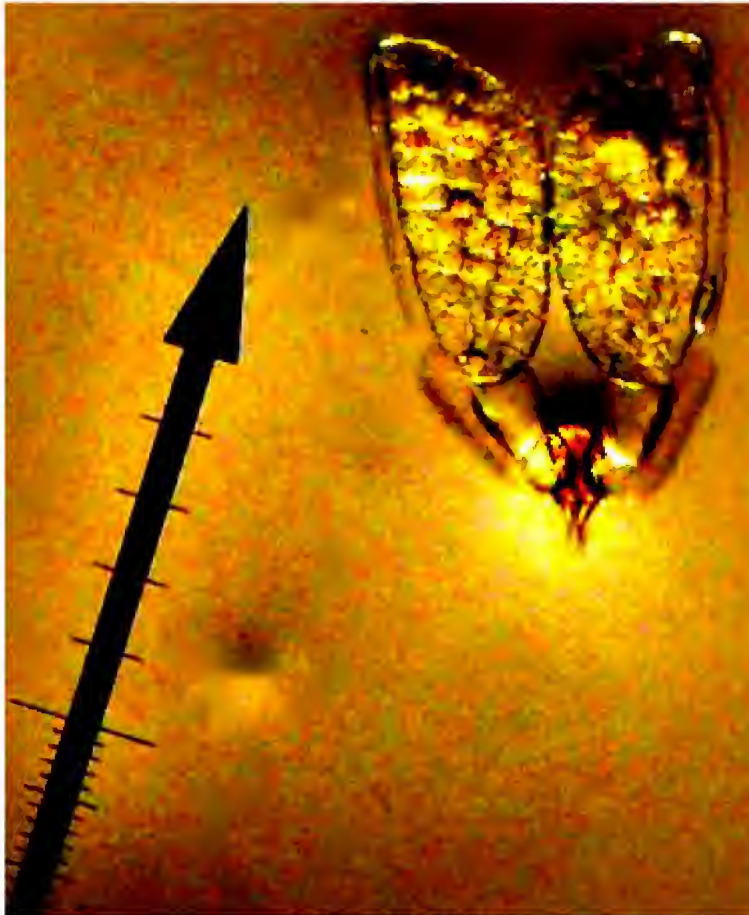
Translator/caudicle type:
fb/cw

Caudicle: C clear

Pollinia inner apex type: T

Retinacula character: LS

Hoya taeahwa subsp. tayuncisensis Kloppenburg & Mendoza
(unpublished) GM #201



Pollinarium enlarged 190x.

Pollinium

length 0.23 mm
widest 0.12 mm

Retinaculum

length 0.06 mm
shoulder 0.04 mm
waist 0.02 mm
hip 0.04 mm
ext. 0.03 mm

Translator

length 0.13 mm
widest 0.03 mm

Caudicle

top 0.05 mm
deep 0.05 mm
stem 0.02 mm

Type: C

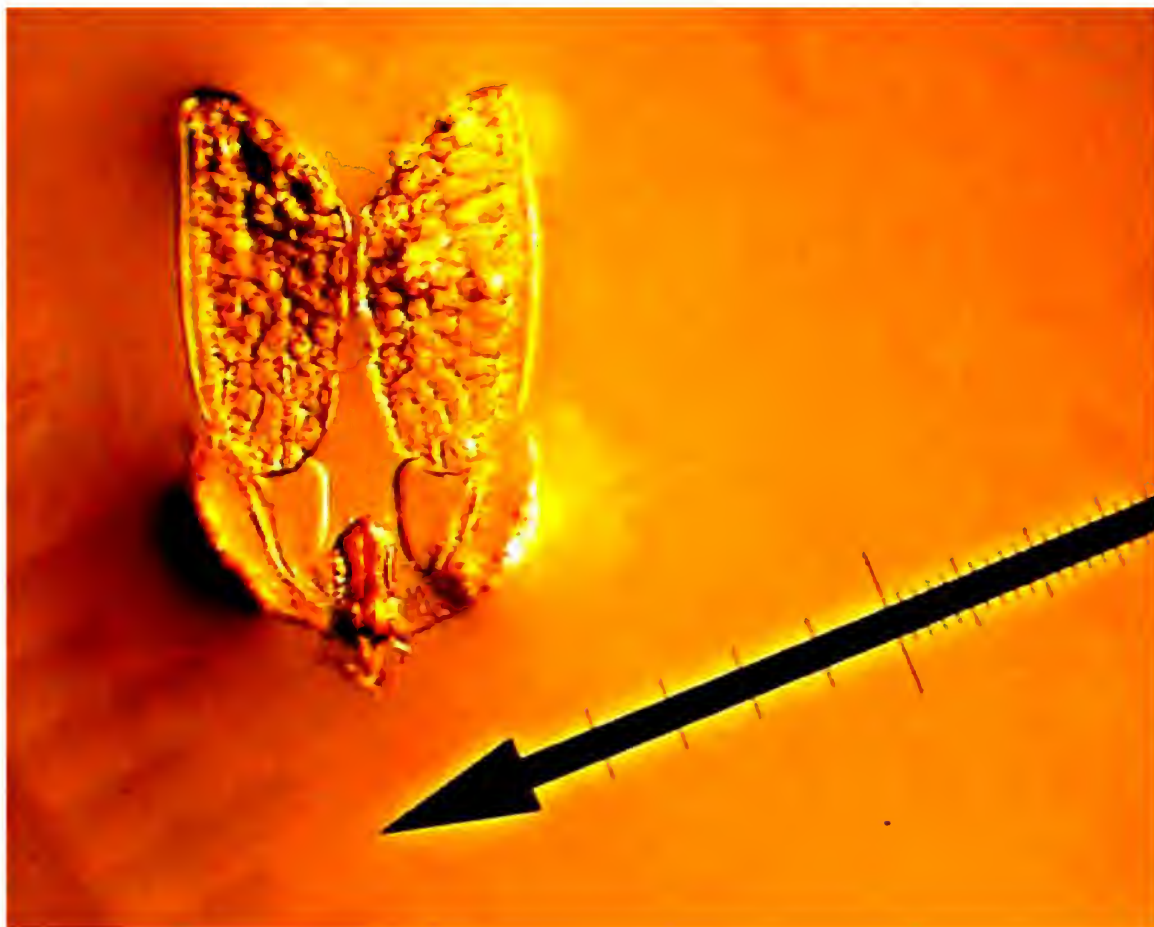
Translator/caudicle type:
fb/cw

Pollinia inner ends: T
(tapered)

Caudicle bulb: C

Retinacula character: R

Hoya nagcarlanensis Kloppenburg, Mendoza
(unpublished) GM #105



Pollinarium enlarged ca. 200x.

Pollinium

length	0.23 mm
widest	0.11 cm

Retinaculum

length	0.07 cm
shoulder	0.04 mm
waist	0.03 mm
hip	0.04 mm
ext.	0.04 mm

Retinacula character: LS

Translator

length	0.14 mm
widest	0.04 mm

Translator/caudicle type fb/cw

Pollinia apex type: T

Caudicle

bulb	0.05 x 0.06 mm
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Caudicle clear

Hoya caespitosa Kloppenburg & Mendoza
(unpublished) GM #51



Pollinarium enlarged ca.
190x.

Pollinarium

length 0.22 mm
widest 0.08 mm

Retinaculum

length 0.08 mm
shoulder 0.04 mm
waist 0.03 mm
hip 0.04 mm
ext. 0.02 mm

Translator

length 0.09 mm
wide 0.02 mm

Caudicle

bulb dorsal 0.05 mm
depth 0.06 mm

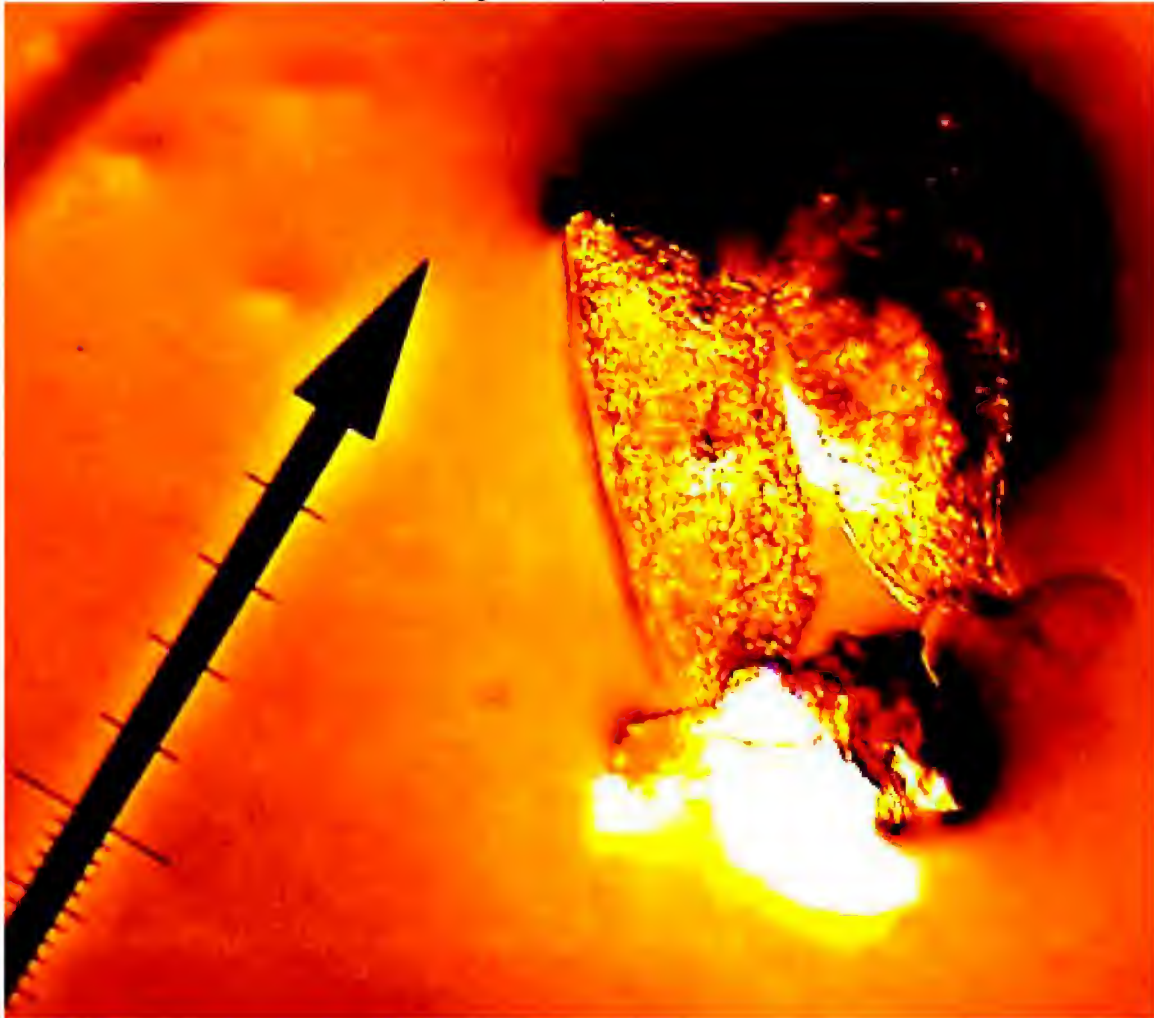
Type: G

Translator/caudicle type: fb/cw

Pollinia end type: T

Retinacula character: LS

Hoya bulba Kloppenburg & Mendoza
(unpublished) GM #82



Pollinarium above enlarged ca. 230x.

Pollinium

length	0.22 mm
widest	0.12 mm

Retinaculum

length	0.07 mm	measured always from head to the crotch
shoulder	0.07 mm	
waist	0.05 mm	
hip	0.06 mm	
ext.	0.03 mm	

Retinacula character: S

Translator

length	0.13 mm
widest	0.03 mm

Caudicle

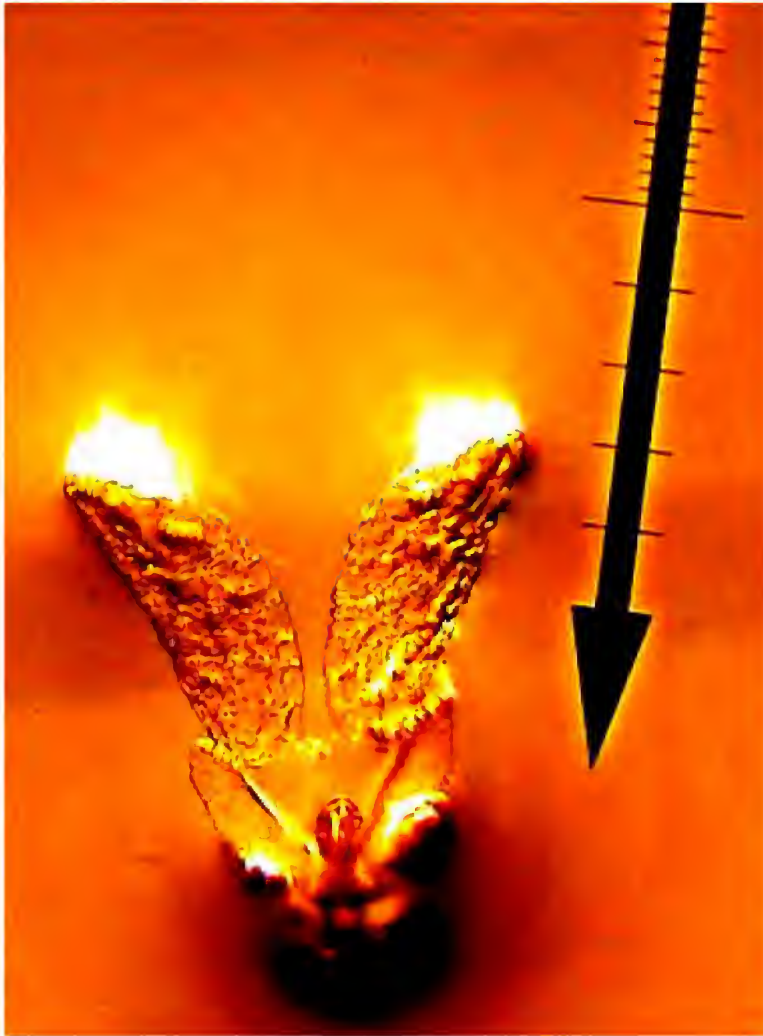
bulb diam.	0.07 mm
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Translator/caudicle type: fb/o

Pollinia end type: RF

Caudicle bulb: C

Hoya liquida Kloppenburg & Mendoza
(unpublished) GM #96



Pollinarium enlarged ca.
190x.

Pollinium

length 0.22 mm
widest 0.09 mm

Retinaculum

length 0.07 mm
shoulder 0.03 mm
waist 0.02 mm
hip 0.03 mm
ext. 0.03 mm

Translator

length 0.13 mm
widest 0.04 mm

Caudicle

bulb top 0.06 mm
bulb depth 0.07 mm

Type: C

Translator/caudicle Type:
fb/cw.

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: R

Retinaculum measurement length is from the inner head to the crotch and does not include the lower extensions (the division of the retinaculum proper).

Hoya linguiforma Kloppenburg & Mendoza
(unpublished) GM #103



Pollinarium enlarged ca.
220x.

Pollinium

length 0.22 mm
widest 0.09 mm

Retinaculum

length 0.07 mm
shoulder 0.04 mm
waist 0.03 mm
hip 0.05 mm
ext. 0.04 mm

Translator

length 0.15 mm
widest 0.04 mm

Caudicle

bulb 0.05 x 0.06 mm

Type: C

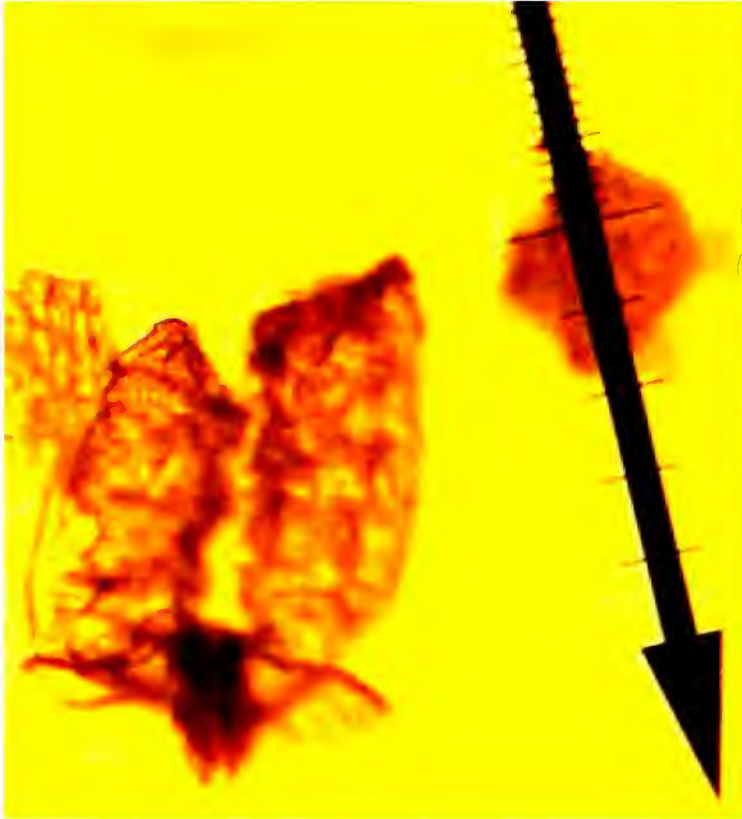
Translator/caudicle type:
fb/cw

Pollinia inner apex type: F

Caudicle bulb: C

Retinacula character: LS

Hoya acanthopenta Kloppenburg & Mendoza
(unpublished) GM #202



Pollinarium enlarged 210x.

Pollinium

length 0.22 mm
widest 0.11 mm

Retinaculum

length 0.07 mm
shoulder 0.07 mm
waist 0.03 mm
hip 0.06 mm
ext. 0.02 mm

Translator

length 0.09 mm
widest 0.06 mm

Caudicle 0.06 x 0.04 mm

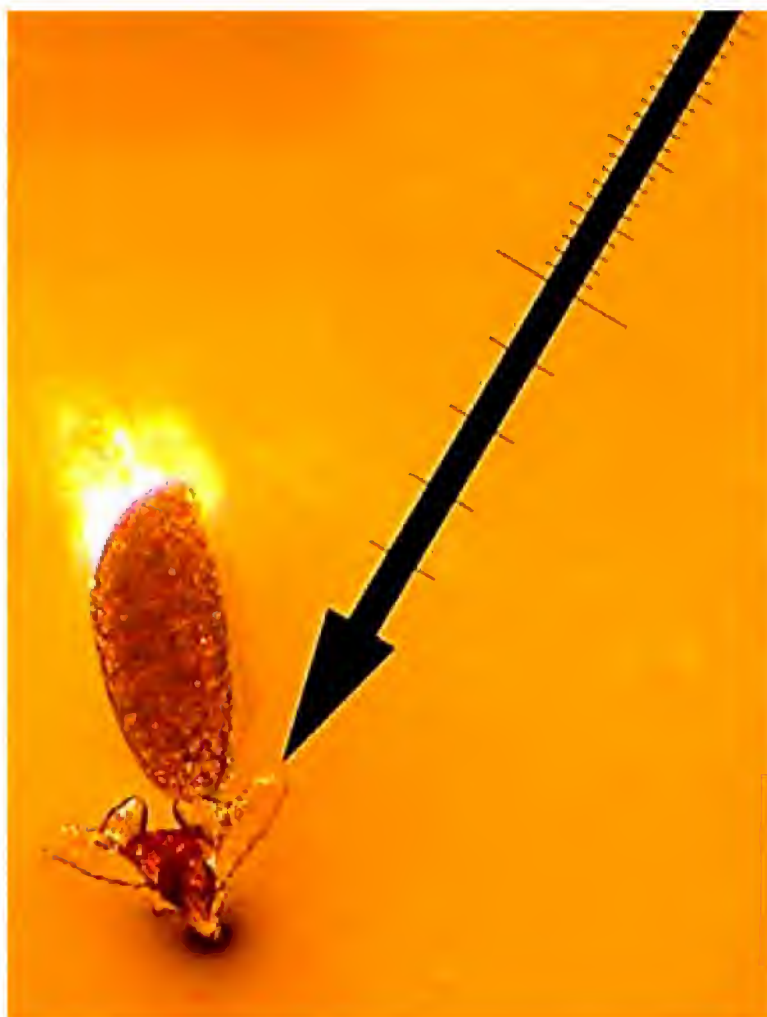
Translator/caudicle type:
fb/cw.

Pollinia inner apex type: F

Caudicle bulb: ?

Retinacula character: S

Hoya cupula Kloppenburg, Mendoza & Ferreras 2013
ISSN 10055-4564



Pollinarium enlarged ca.
210x.

Pollinium

length 0.21 mm
widest 0.08 mm

Retinaculum

length 0.05 mm
shoulder 0.07 mm
waist 0.03 mm
hip 0.04 mm
ext. 0.02 mm

Translators

length 0.08 mm
widest 0.02 mm

Caudicle

bulb diam. 0.02 x.03
mm

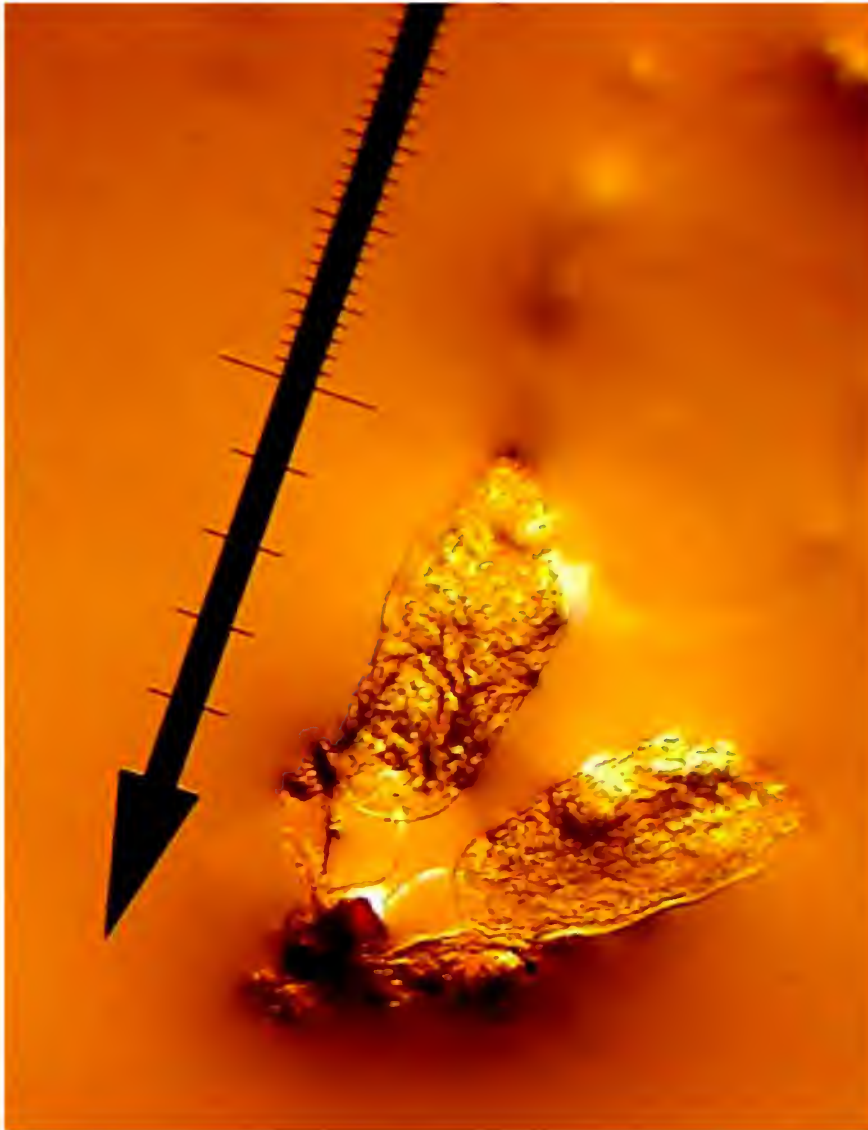
Translator/caudicle type:
fb/cw

Pollinia inner apex type:
T

Caudicle bulb: C

Retinacula character: S

Hoya rosarioae subsp. realensis Kloppenburg & Mendoza
(unpublished) GM #65



Pollinarium
enlarged ca. 220x.

Pollinium

length 0.21 mm
widest 0.10 mm

Retinaculum

length 0.05 mm
shoulder 0.04 mm
waist 0.02 mm
hip 0.03 mm
ext 0.01 mm

Translator

length 0.10 mm
wide 0.03 mm

Caudicle

bulb measurements
0.04 x 0.7mm

Type: clear

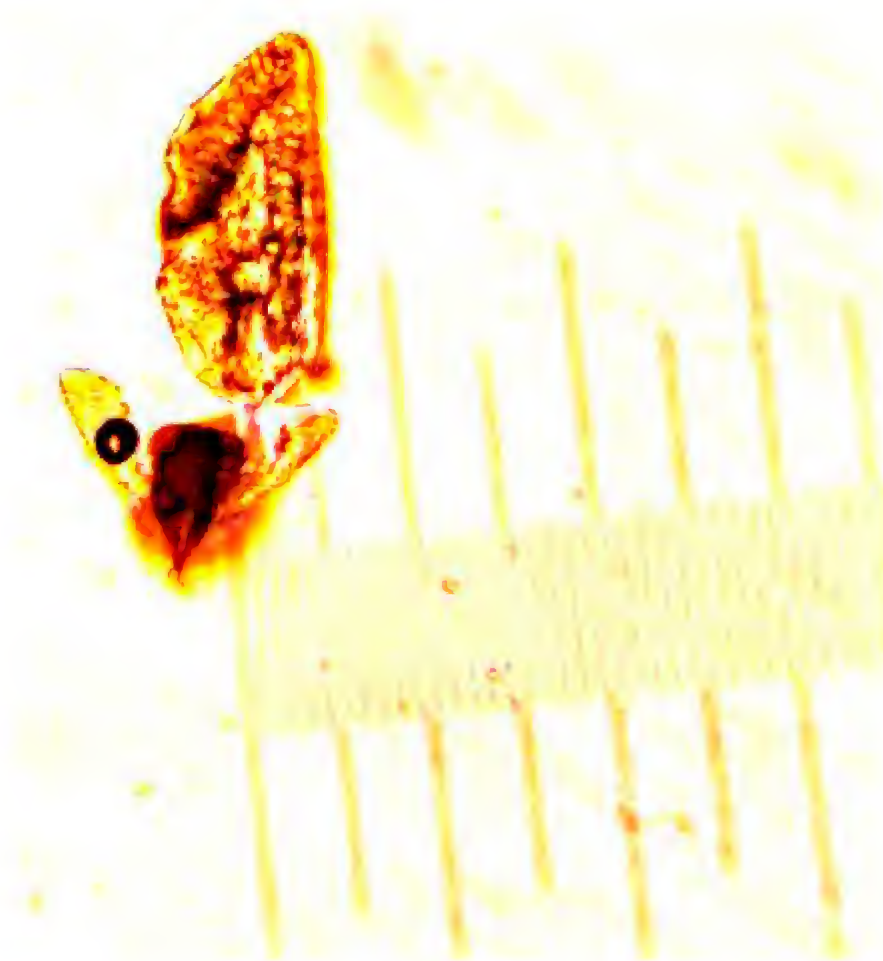
Translator/caudicle Type: fb/o

Pollinia inner apex type: T

Retinacula character: S

Hoya leytensis Elmer ex Burton

Hoya sp. IML 228 via Peter Tsang 1979



Pollinarium
enlarged about
165x.

Pollinium

length 0.21 mm
widest 0.10 mm

Retinaculum

length 0.08 mm
shoulder 0.06 mm
waist less
hip 0.05 mm
ext. 0.03 mm

Translators

length 0.10 mm
widest 0.02 mm

Caudicle

bulb diam. 0.03 mm
.

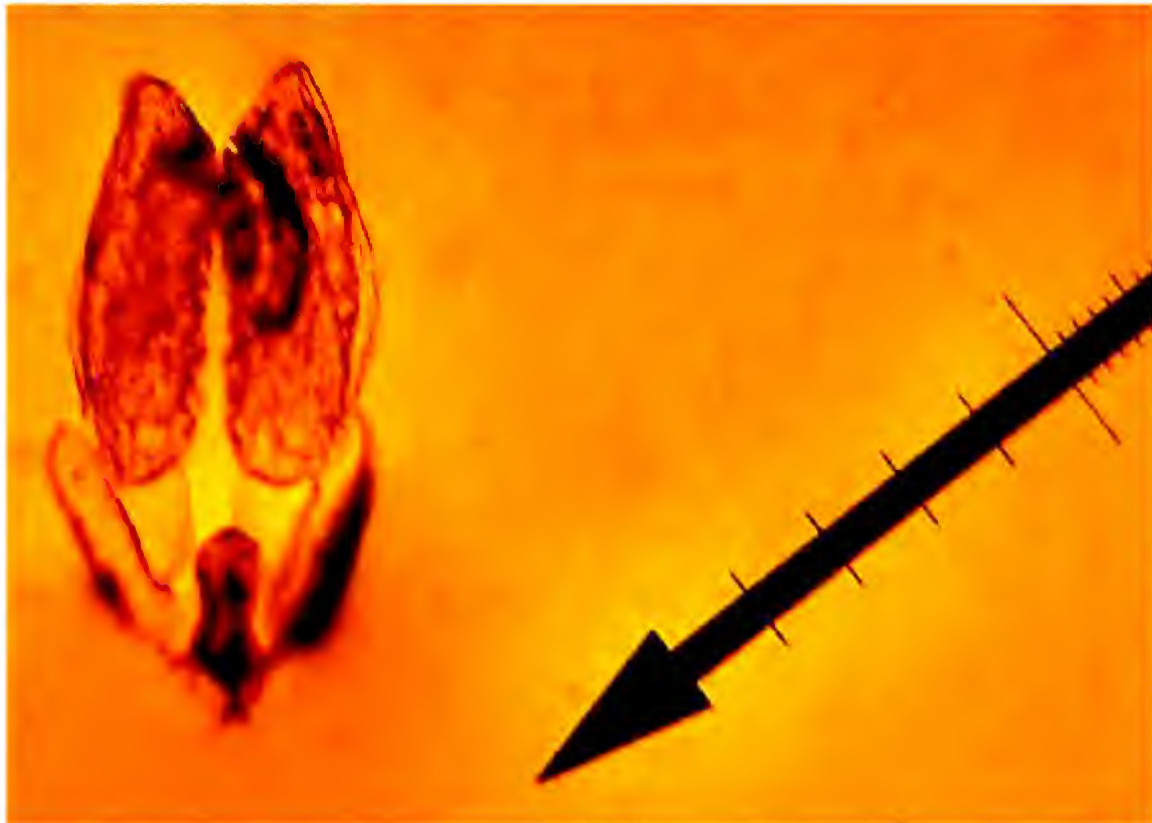
Translator/caudicle type: fb/cw

Pollinia end type: F

Caudicle bulb: C

Retinacula character: R

Hoya unica subsp. bakerensis Kloppenburg & Mendoza
(unpublished) GM #155



Pollinium enlarged 240x.

Pollinium

length 0.21 mm
widest 0.07 mm

Translator/caudicle type: lb/o

Pollinia apex type: T

Retinaculum

length 0.07 mm
shoulder 0.03 mm
waist 0.02 mm
hip 0.04 mm
ext. 0.02 mm

Retinacula character: E

Translator

length 0.14 mm
widest 0.03 mm

Caudicle

bulb 0.04 x 0.06 mm

Type: C

Hoya pubacupula Kloppenburg Mendoza
(unpublished) GM #25



Pollinarium enlarged ca.
260x.

Pollinium

length 0.20 mm
widest 0.09 mm

Retinaculum

length 0.03 mm
shoulder 0.04 mm
waist 0.03 mm
hip 0.04 mm
ext. 0.03 mm

Translator

length 0.08 mm
wide 0.03 mm

Caudicle

bulb diam. 0.03 mm

Translator/caudicle type:
fb/cw

Caudicle bulb. G

Pollinia end type: R/T

Hoya picta Miquel 1856

Flower from Ted Green. Kaaawa, Hawaii
Plant cut from Ruurd van Donkelaar, Holland



Pollinia

length	0.20 mm
widest	0.08 mm

Retinaculum

length	0.06 mm
shoulder	0.04 mm
waist	0.02 mm
hip	0.04 mm
ext.	0.02 mm

Translator

length	0.09 mm
depth	0.02 mm

Caudicle

bulb diam.	0.04 mm
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Translator/caudicle type: fb/cw

Pollinia end type: FT

Caudicle bulb: G

Retinacula character: S

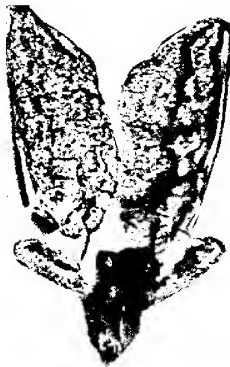
Hoya bilobata Schlechter 1908 ?

Grown and flowered in Fresno, CA. USA.



	<u>top clone</u>	<u>bottom clone</u>
Pollinium		
length:	0.22 mm	0.19 mm
widest:	0.09 mm	0.08 mm
Retinaculum		
length:	0.07 mm	0.08 mm
shoulder	0.06 mm	0.06 mm
waist:	0.04 mm	0.04 mm
ext.:	0.03 mm	0.03 mm
Translators		
length:	0.08 mm	0.08 mm
depth:	0.03 m.	0.03 mm
Caudicle		
bulb diam:	0.04 mm	0.03 mm

Red edged leaf clone
Magnified approximately 165x.



Translator/caudicle type: fb/cw

Pollinia end type: F

Caudicle bulb: C

Retinacula character: S

Clone IML 228 affinis *H. bilobata* Schltr..

Magnified approximately 165x.

Hoya amorosoae T. Green & Kloppenburg 2014
sp. Mindanao, Philippines



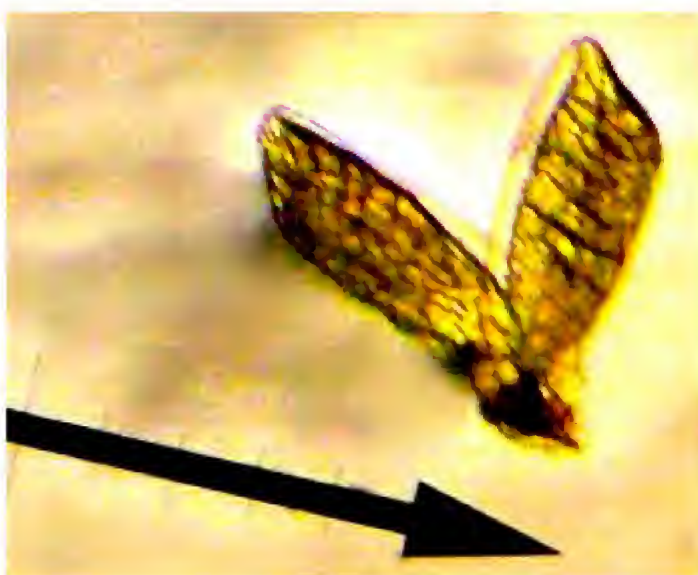
Pollinarium photo enlarged 301x.

Retinaculum

length	0.05 mm
shoulder	0.05 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.03 mm

Translators

length	0.08 mm
widest	0.04 mm



Pollinarium enlarged 200x.

Pollinia

length	0.20 mm
widest	0.09 mm

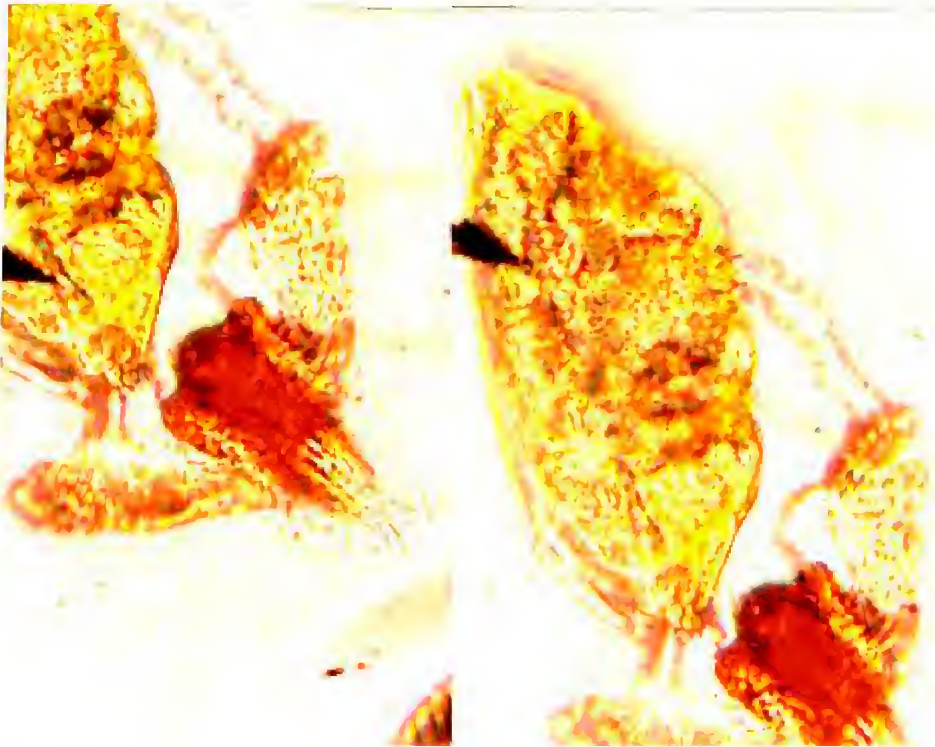
Translator/caudicle type: fb/cw

Pollinia ends: F

Caudicle bulb: ?

Retinacula character: S ?

Hoya sp. DS #1
Most likely *Hoya bilobata* Schlechter.



Pollinium

length	0.19 mm
widest	0.08 mm

Retinaculum

length	0.05 mm
shoulder	0.05 mm
waist	0.03 mm
hip	0.04 mm
ext.	0.03 mm

Translator

length	0.08 mm
depth	0.01 mm
width	0.03 mm

Caudicle

bulb diam	0.4 mm
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Translator/caudicle type: fb/cw

Pollinia ends: F

Caudicle bulb: G

Retinacula character: S

Hoya brittonii Kloppenburg, 1992

Type: Britton #19519, PNH Badoc, Calapan, Mindoro Creek, Mindoro, Philippines



Pollinarium with
one pollinium
missing enlarged
about 80X.

Pollinium

	length	0.19 mm			
	widest	0.09 mm	Translators		
			length	0.09 mm	
Retinaculum			wide	0.01 mm	
	length	0.05 mm			
	shoulder	0.04 mm	Caudicle		
	waist	0.03 mm	bulb diam.	0.03 mm	
	hip	0.04 mm			
	ext	0.01 mm			

Hoya reyesii Medina & Kloppenburg 2016



Retinaculum

Length - 0.5 um (0.05mm)
Shoulder - 0.3 um (0.03mm)
Waist - 0.2um (0.02mm)
Hip - 0.3um (0.03mm)
Extension - 0.2um (0.02mm)

Pollinia

Length - 0.15 mm
Width - 0.05 mm

Pollinia ends somewhat boat-shaped
(flattened) Type” T (tapered)

Translator/caudicle type: - unclear (but
fb/cw type)

Caudicle: clear “C”

Retinacula type: HU

Pollinia inner end type: R

Pollinia Types 2017

p/o

1. *Hoya pruinosa* Miquel 1856
2. *Hoya obtusifolia* Wight 1834
3. *Hoya sp.* UC #18041
4. *Hoya mitrata* Kerr 1940
5. *Hoya meliflua* subsp. *nuevaensis* Kloppenburg & Mendoza
6. *Hoya meliflua* subsp. *darastanensis* Kloppenburg & Mendoza
7. *Hoya sp.* PNH 24031
8. *Hoya georgemendozae* Kloppenburg
9. *Hoya odorata* Schlechter 1906
10. *Hoya patameaensis* Kloppenburg 2017
11. *Hoya purpureofusca* Hooker f. 1849
12. *Hoya tamdaoensis* Rodda & T. B. Tran 2015
13. *Hoya leucorhoda* Schlechter 1913
14. *Hoya sp.* new *acuta* T.G.
15. *Hoya rigida* Kerr 1939
16. *Hoya limoniaca* S. Moore 1921
17. *Hoya wibergiae* subsp. *alba* Kloppenburg 2015
18. *Hoya estrellaensis* T. Green & Kloppenburg 2012
19. *Hoya ngtabon sp. nov*
20. *Hoya benguetensis* Schlechter 1906
21. *Hoya bicolor* Kloppenburg 2000
22. *Hoya crassicaulis* Elmer ex Kloppenburg 1995
23. *Hoya sp.* Nagtabon, Palawan 1995
24. *Hoya finlaysonii* Wight 1834
25. *Hoya amoena* subsp. *bogorensis* Green & Kloppenburg 2014
26. *Hoya sp.* 900129
27. *Hoya sp.* Edano (PNH) 14203 1951
28. *Hoya sp.* CAHUP 3935, Hernaez 2 March 1990
29. *Hoya marlowii* Kloppenburg & Mendoza
30. *Hoya Clemensorum* Green 2001
31. *Hoya sp.* Long Miau #1405 8/25/00
32. *Hoya marlowii* Kloppenburg & Mendoza
33. *Hoya lavacensis* Kloppenburg, Guevarra & Carandang
34. *Hoya ilagiorum* Kloppenburg & Siar 2011
35. *Hoya marlowii* subsp. *polilloensis* Kloppenburg & Mendoza
36. *Hoya lucbanensis* subsp. *papillata* Kloppenburg & Mendoza
37. *Hoya lucbanensis* Kloppenburg & Mendoza
38. *Hoya velasioii* Kloppenburg 2015
39. *Hoya blashernaezii* subsp. *recurvula* Kloppenburg & Cajano
40. *Hoya blashernaezii* subsp. *grandiora* Kloppenburg & Mendoza
41. *Hoya odorata* Schlechter 1906 (*Hoya paziae*)
42. *Hoya querinoensis* Kloppenburg & Siar 2007

43. **Hoya blashernaezii subsp. aurantiaca** Kloppenburg & Mendoza
44. **Hoya columna** Kloppenburg 2014
45. **Hoya sp.** CAHUP 63826
46. **Hoya sp.** CAHUP 41945
47. **Hoya sp. NS 005**
48. **Hoya bebsguevarrae** Kloppenburg & Carandang 2013
49. **Hoya bicolensis** Kloppenburg, Siar & Cajano 2013
50. **Hoya nyhuusiae** Kloppenburg 2003
51. **Hoya subrosea** Kloppenburg & Mendoza
52. **Hoya pinnata** Kloppenburg & Mendoza
53. **Hoya unruhiana subsp. maubanensis** Kloppenburg & Mendoza

Hoya pruinosa Miquel 1856

flower from Ted Green. Syn. *Hoya curtisii* K & G.

Section Acanthostemma (BL) Kloppenburg Subsection Angusticarinata Kloppenburg



Pollinium

length: 0.97 mm
widest: 0.28 mm

Retinaculum

length: 0.09 mm
shoulder: 0.09 mm
waist: 0.06 mm
hip: 0.04 mm
ext.: 0.09 mm

Translators

length: 0.20 mm
depth: 0.03 mm

Caudicle

bulb diam.: 0.08 mm

Translator/caudicle

type: p/cw

Pollinia inner end

type: R

Caudicle bulb: clear C

Retinacula character:

HE ?

Hoya obtusifolia Wight 1834

Flower from CT, Bangkok Thailand.



Magnified approximately 65x.

Pollinium

length: 0.95 mm

widest: 0.30 mm

Retinaculum

length: 0.30 mm

shoulder: 0.16 mm

waist: 0.05 mm

hip: 0.13 mm

ext.: 0.10 mm

Translators

length: 0.18 mm

depth: 0.05 mm

Caudicle

bulb diam.: ca 0.10 mm

Translator/caudicle type: p/o

Pollinia inner end type: R

Caudicle bulb: granulate

Retinacula character: HE

Hoya sp. UC #18041

as *Hoya odorata*



Pollinarium enlarged about 165x. Inner pollinium ends rounded, Pellucid edge extends all the way to the base, Retinaculum with long narrow rounded head and nearly the same width all the way down, translators connected well down.

Pollinium

length	0.92 mm
widest	0.29 mm

Retinaculum

length	0.44 mm
widest	0.17 mm
extensions	0.04 mm

Translator/caudicle type: p/o

Pollinia inner end type: R

Caudicle bulb: granulate

Retinacula character: E

This specimen is like (UC) 13176 and maybe (UC) 29638 and (UC) 13860.

Hoya mitrata Kerr 1940

Flower from CT, Thailand.



Pollinia

length	0.90 mm
widest	0.32 mm

Retinaculum

Head very broadly rounded with flaring shoulder area.

length	0.45 mm
shoulder	0.49 mm
waist	0.29 mm
hip	0.30 mm
extensions	0.25 mm long.

Translators

length	0.19 mm
depth	0.03 mm

Caudicle

Somewhat linear with small bulbous end. Diameter about 0.07 mm

Translator/caudicle type: p/o

Pollinia inner end type: R

Retinacula character: R

Hoya meliflua subsp. nuevaensis Kloppenburg & Mendoza
(unpublished)



Pollinarium enlarged 90x.

Pollinium

length	0.84 mm
widest	0.24 mm

Retinaculum

length	0.23 mm
shoulder	0.22 mm
waist	0.06 mm
hip	0.11 mm
ext	0.05 mm

Translator

length	0.11 mm
widest	0.03 mm

Caudicle

bulb	0.08 mm
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Translator/caudicle type: p/o

Pollinia apex type: T

Retinacula character: S

Hoya meliflua subsp. darastanensis Kloppenburg & Mendoza
(unpublished) GM #190



Pollinarium enlarged 120x.

Pollinium

length 0.80 mm
widest 0.25 mm

Retinacula

length 0.21 mm
shoulder 0.26 mm
waist 0.10 mm
hip 0.15 mm
ext. 0.12 mm

Translator

length 0.16 mm
widest 0.09 mm

Caudicle

bulb 0.10 mm

Translator/caudicle type: p/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: R

Hoya sp. PNH 24031



Pollinarium enlarged about 165x

Pollinium

length	0.78 mm
widest	0.25 mm

Retinaculum

length	0.14 mm
shoulder	0.13 mm
waist	0.08 mm
hip	0.09 mm
ext.	0.04 mm

Translators

length	0.08 mm
depth	0.02 mm

Caudicle

bulb diam.	0.04 mm
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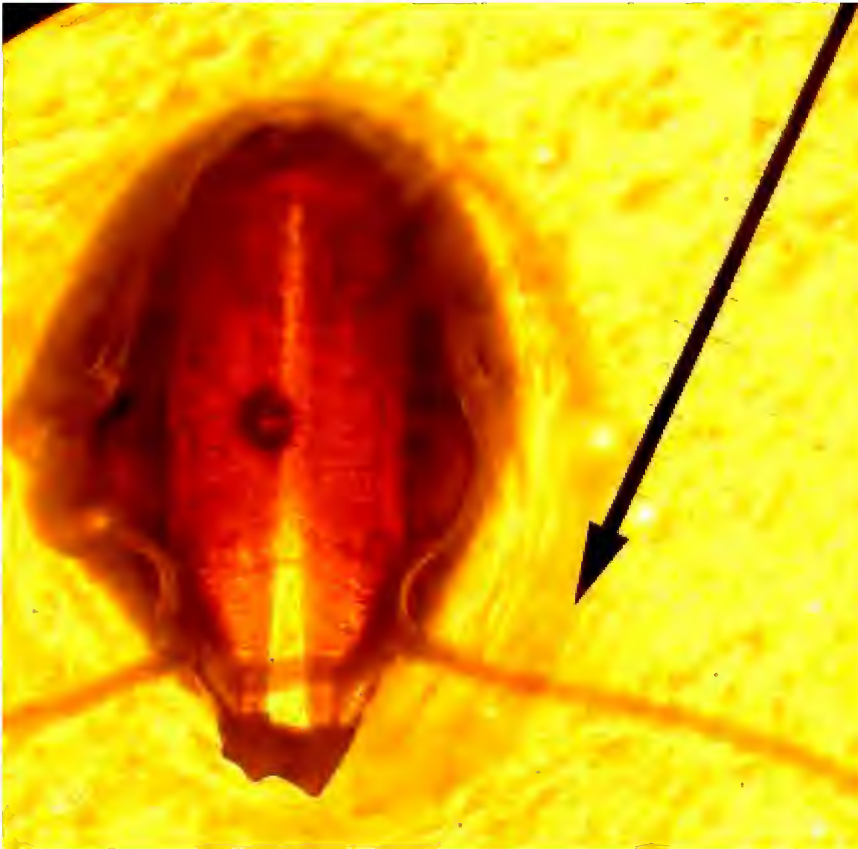
Translator/caudicle type: p/o

Pollinia end type: R

Caudicle bulb: G

Retinacula character: S

Hoya georgemendozae Kloppenburg
(unpublished) GM #1



Retinaculum
enlarged ca. 149x.

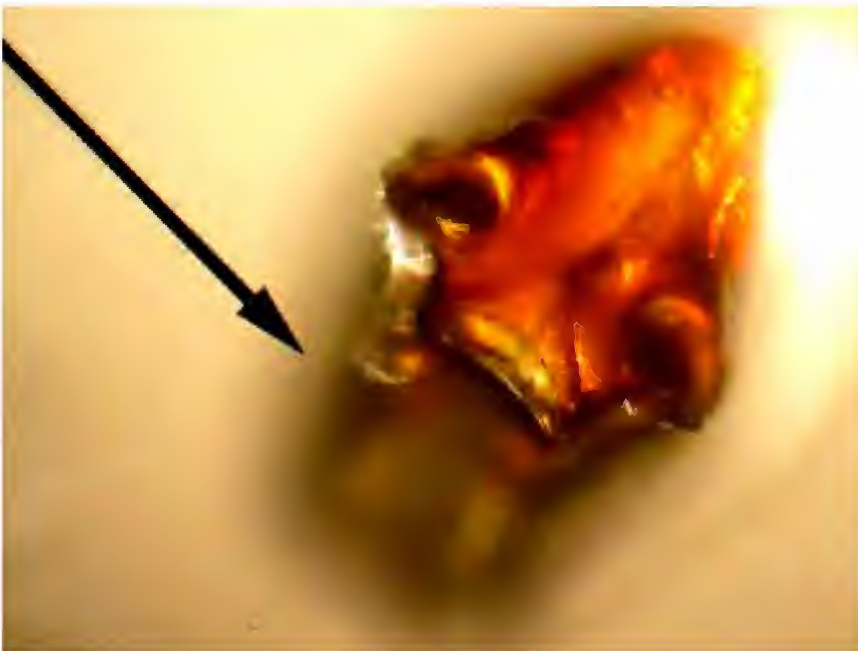
The pollinia had not
been connected to
the retinaculum by
the translators or
caudicles (flowers
immature ?)

The retinacula are
very large.

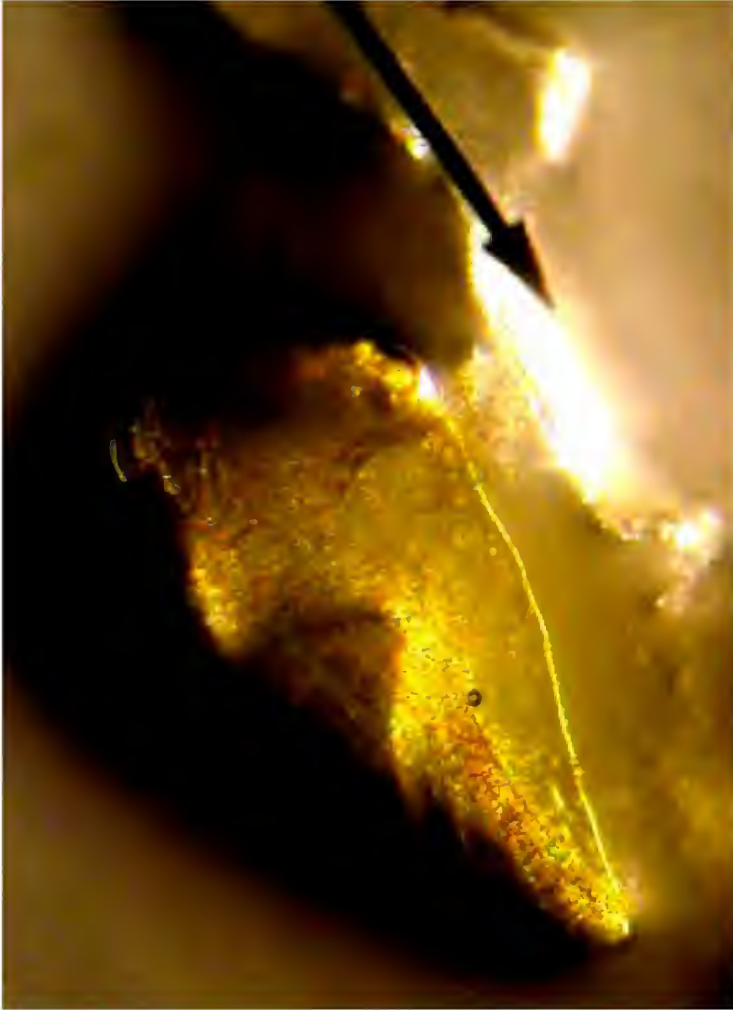
Retinaculum

length	0.52 mm
widest	0.40 mm
waste	0.25 mm
ext.	0.27 mm

The total length
would be 79 mm.



Bottom view of the
retinaculum: it has
two horn-like
projections at the
widest portion and
below cut off in a
semicircle
configuration.



Pollinium extracted (with difficulty) from the anther pocket. Measurements may not be entirely accurate.

length 0.75 mm
widest 0.32 mm

Note it tapers from a small end to a much broader apex to the top right.

This is close to *Hoya darwinii* Loher 1910

Translator/caudicle type:
p/o

Pollinia end type: R

Caudicle Bulb: ?

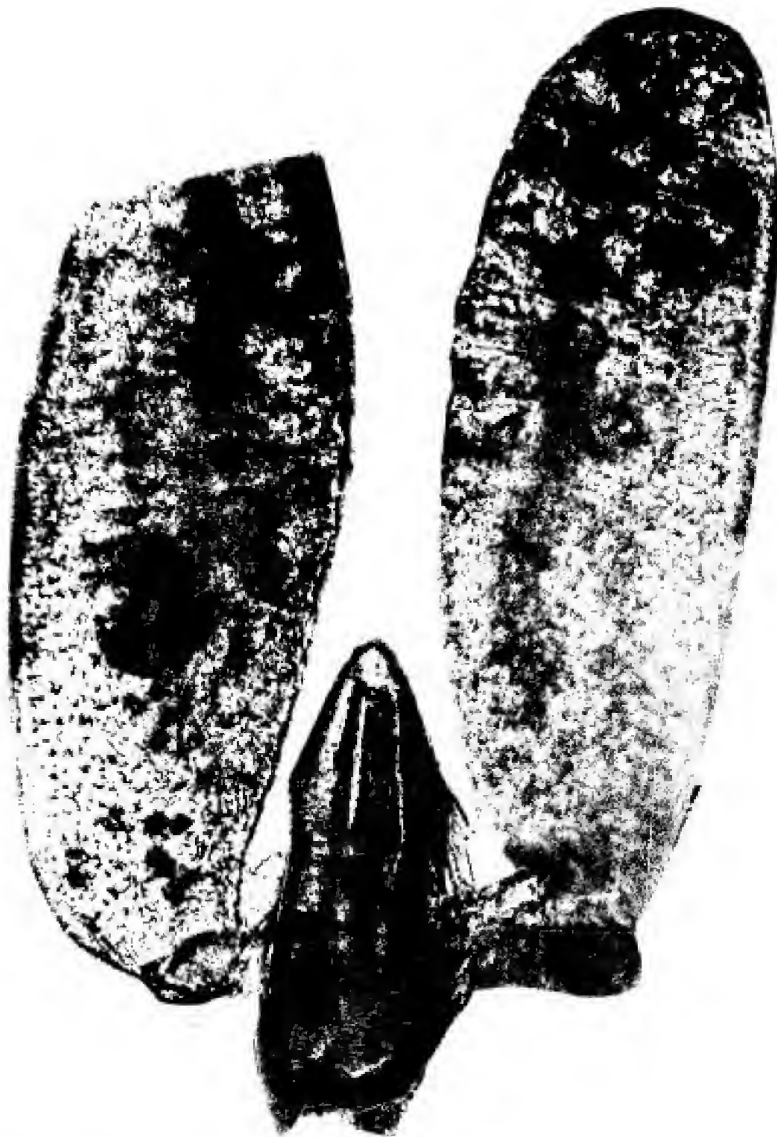
Retinacula character: R



One more picture of the retinaculum here enlarged ca. 180x. Very similar to that of *Hoya darwinii* Loher.

Hoya odorata Schlechter 1906

Flower from Salvosa 29638 (UC) 1924, Polillo Is., Philippines



Magnified approximately
165x.

Pollinium length: 0.73 mm; widest: 0.25 mm

Retinaculum length: 0.38 mm; shoulder: 0.15 mm; waist: 0.12 mm.; hip: 0.17 mm;
ext.: 0.02 mm

Translators length: 0.14 m.; depth: 0.05 mm

Caudicle bulb diam.: 0.10 mm

Translator/caudicle type: p/o

Retinacula character: HE

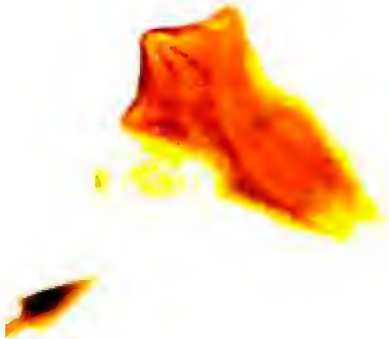
Pollinia inner end type: R

Caudicle bulb: G

Hoya patameaensis Kloppenburg 2017

sp. W 1796

Labeled *H. chlorantha* then determined to be *H. betchei*. It is neither



Retinaculum enlarged about 165x. One translator attached to the left.

length	0.27 mm
shoulders	0.18 mm
waist	0.08 mm
hips	0.14 mm
extensions	0.05 mm

Translator

length	0.15 mm
depth	0.03 mm

Caudicle bulb

diam. 0.03 mm it is somewhat flattened.



Pollinarium enlarged about 165x. A foreign object lays to the left above the dark retinaculum.

Pollinium

length	0.73 mm
widest	0.24 mm

Translator/caudicle type: p/o

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: S

Hoya chlorantha Reich. 13 March 1974, det. Feb. 1975 as *Hoya betchei* (Schltr.) Whistler. Savai'i, Samoa.

Hoya purpureofusca Hooker 1849

Flower from a clone flowered and grown in Fresno, CA. USA.



Pollinium

length 0.73 mm

widest 0.25 mm

Retinaculum

length 0.30 mm

shoulder 0.17 mm

waist 0.07 mm

hip 0.11 mm

extensions 0.04 mm

Translators

length 0.20

mm

depth 0.02 mm

Caudicle

bulb diam. ?

Translator/caudicle type: p/o

Pollinia inner end type: RT

Caudicle bulb: ?

Retinacula character: S

Hoya tamdaoensis Rodda & T. B. Tran 2015



Pollinium

Pollinia

length 0.72 mm
widest 0.26 mm

Retinaculum

length 0.28 mm
shoulder 0.16 mm
waist 0.09 mm
hips 0.12 mm
extensions 0.09 mm

Translators

length 0.12 mm
depth 0.07 mm

Caudicle

bulb diam. 0.06 mm

Translator/caudicle type:
p/o

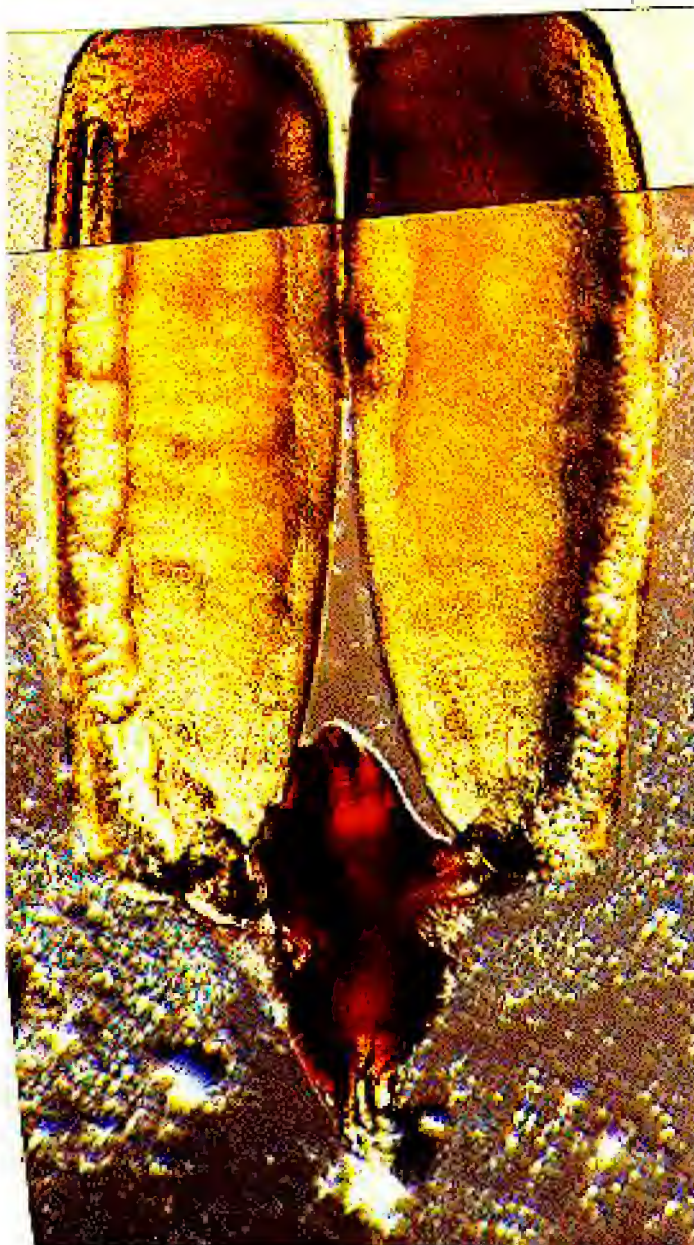
Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Hoya leucorhoda Schlechter 1913

From Ted Green ABG #85-1515 via Liddle's Australia.



A composite (2) picture of the pollinarium enlarged about 165x. The pollinia are long and the

retinaculum is large.

Pollinia

length	0.71 mm
widest	0.25 mm

Retinaculum

length	0.30 mm
shoulder	0.17 mm
hips	0.08 mm
waist	0.14 mm
extensions	0.05 mm

Translators

length	0.09 mm
depth	0.02 mm

Caudicle

bulb diameter	0.05 mm
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Translator/caudicle type: p/o

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: R

Hoya sp. new acuta T.G.

Flowers and cutting sent in June 2004 by Ted Green with a unusual nerved leaf, ca. 25 flowers in a cluster. Photographed Monday 21 June 2004.

Pollinarium: There appears to be two distinct pollinaria in this group of species. Those from Malaya have retinacula with a distinct Shoulder that is upswept and curved back toward the stylar table whereas those from Thailand have shoulders that appear not to be swept back and there is very little distinctness in the waist or hip area. This one does not have well developed extensions and I measured what is distinct but barely differentiated tissue.



Pollinia

length 0.65 mm

widest 0.23 mm

Retinaculum

length 0.22 mm

shoulder 0.11 mm

waist 0.09 mm

hip 0.10 mm

ext. 0.05 mm

Translators

length 0.13 mm

depth 0.04 mm

Caudicle

bulb diam. 0.09 mm

Translator/caudicle

type: p/o

Pollinia inner end

type: T

Caudicle bulb: G

Retinacula

character: E

Hoya rigida Kerr 1939

Flowers (in Alcohol) sent me by Chanin Thorut from Bangkok, Thailand 3/12/92.



The pollinarium enlarged about 165x. The apices of the pollinia are slightly truncate or squared off. There is a strong pellucid border with a rather uniform width to the vacuole, the pollinia are long. The translators are narrow and rather short and the caudicles are not well defined. The retinaculum has a winged head and also winged at the hip and tapers to the outer apex from this area.

One more view of the pollinarium at a slightly different focal length enlarged again about 165x. I wanted you to see the distinctive wings or curls on each side of the head and again duplicated at the hip area. The show up better on the original photo.

Pollinia

length	0.65 mm
widest	0.24 mm

Retinaculum

length	0.22 mm
shoulder	0.12 mm
waist	0.09 mm
hip	0.12 mm
extensions	0.03 mm

Translators

length	0.10 mm
depth	0.02 mm

Translator/caudicle type: p/o

Pollinia inner end type: T

Caudicle

bulb diam.	0.07 mm
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Caudicle bulb: ?

Retinacula character: S

Hoya limoniaca S. Moore 1921

Flower via Ann Wayman, Central Point, OR. USA.



The pollinarium enlarged approx. 165 times. The pollinia have a well defined sterile edge with a large vacuole just in from it. Note the upper and lower extremes of the sterile edge. The lower end seems to end well above the inner apex. The translators are very unusual with what appears to be rounded projections from the waist area of the retinaculum supporting the clear small caudicles. Since the translators are normally a wedge shape it may be that the upper edge of this structure is here rolled over. The retinaculum is very broad at the hip area.

Pollinium

length	0.62 mm
widest	0.19 mm

Retinaculum

length	0.22 mm
head	0.10 mm
waist	0.07 mm
hip	0.08 mm
Vacuole	ca. 0.03 mm

Translator

(external)	0.10 mm
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Caudicle	0.03 mm diam.
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Translator/caudicle type: p/o

Pollinia apex type: T

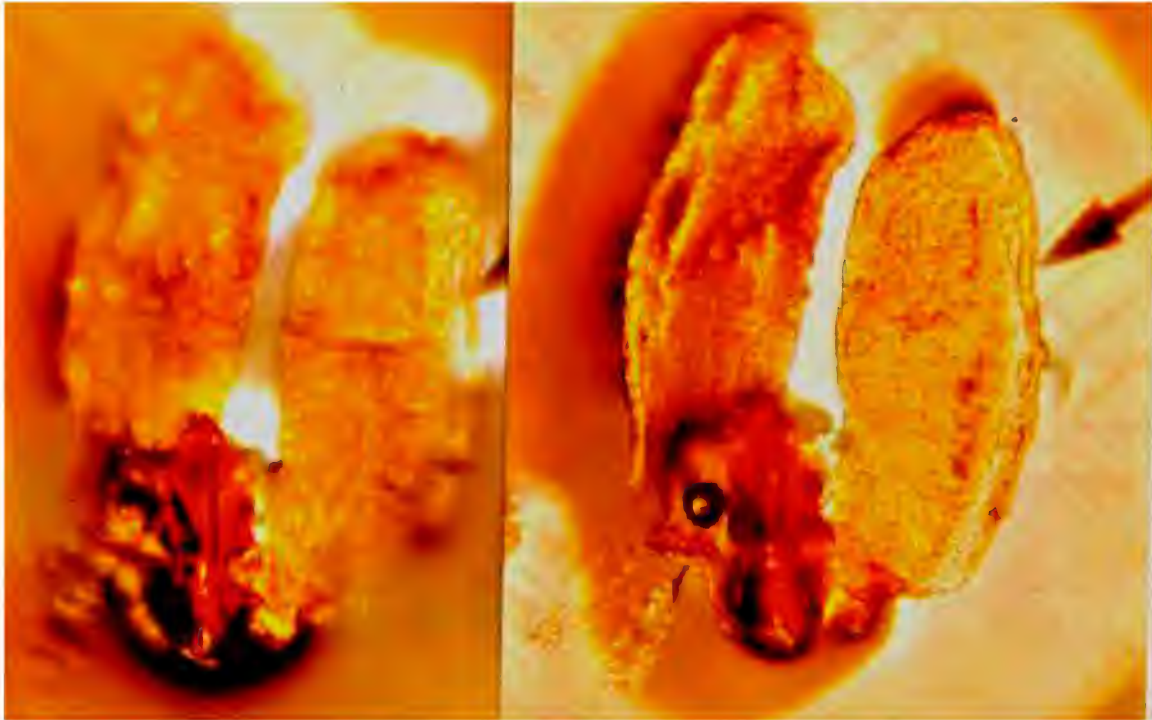
Caudicle bulb: G

Retinacula character: S

***Hoya wibergiae* subsp. *alba* Kloppenburg 2015**

PNH 14203

Collected by G. E. Edano Victoria Mts. Palawan 18 March 1951 growing in moss labeled *H. gracilis* Schlechter incorrectly, it is not in the Section *Acanthostemma* (Bl.) Klopp. White flower 600m elevation. This appears to be ***Hoya wibergiae*** Kloppenburg. Roll 137 Drawing 245.



Pollinaria enlarged about 85x. **Pollinium:** length 0.60 mm widest 0.25 mm

Retinaculum: length 0.25 mm shoulder 0.10 mm; waist 0.03 mm; hip 0.06 mm ext. 0.01 mm

Translator: length 0.07 mm depth 0.02 mm Caudicle bulb diam. 0.04 mm

Translator/caudicle type: p/o

Pollinia inner end type: RT

Retinacula character: S

Retinacula type: 2S

Hoya estrellaensis T. Green & Kloppenburg 2012



Pollinarium enlarged about 165x.

Pollinium

length 0.57 mm

widest 0.21 mm

Translator

length 0.11 mm

depth 0.07 mm

Retinaculum

length 0.22 mm

shoulder 0.11 mm

waist 0.09 mm

hip 0.03 mm

ext. 0.07 mm

Caudicle

bulb diam. 0.07 mm

Translator/caudicle type: p/o

Pollinia inner end type: RT

Retinacula type: E

Caudicle: G ?

Hoya Nagtabon sp. nov.

Collected at Nagtabon. Palawan, Philippines.
Yellow colored flower.



Pollinarium enlarged about 165x.

Pollinium

length	0.56 mm
widest	0.19 mm

Retinaculum

length	0.22 mm
shoulder	0.08 mm
waist	0.06 mm
hip-1	0.10 mm
hip-2	0.08 mm
ext.	0.02 mm

Translators

length	0.10 mm
depth	0.04 mm
width top	0.02 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: p/o

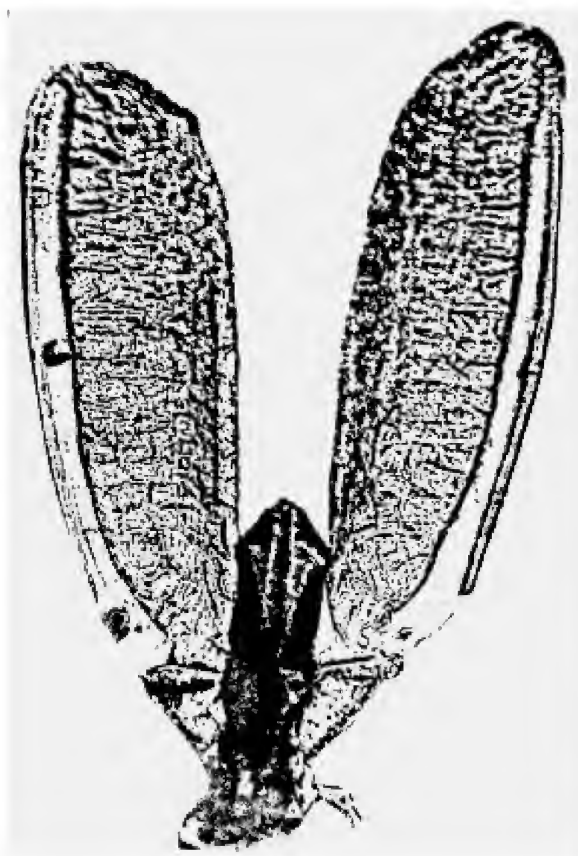
Pollinia inner end type: RT

Retinacula type: E

Caudicle: G

Hoya benguetensis Schlechter 1906

(UC) 14997 Loher, 15 May 1909 ?
Rizal, Luzon, Philippines.



Magnified approximately 165x.

Pollinium

length: 0.54 mm
widest: 0.18 mm

Retinaculum

length: 0.23 mm
shoulder: 0.08 mm
waist: 0.06 mm
hip: 0.07 mm
ext.: 0.05 mm

Translators

length: 0.10 mm
depth: 0.03 mm

Caudicle

bulb. diam.: 0.07 mm

Type: G

Translator/caudicle type: p/o

Pollinia apex type: RT

Caudicle bulb: G

Retinacula character: E

Hoya bicolor Kloppenburg 2000



Pollinarium enlarged about 165x.

Pollinia

length	0.54 mm
widest	0.15 mm

Retinaculum

length	0.25 mm
shoulder	0.07 mm
waist	0.06 mm
hips	0.07 mm
extensions	0.05 mm

Translator

length	0.14 mm
depth	0.02 mm

Caudicle

bulb diameter	0.07 mm
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Translator/caudicle type: p/o

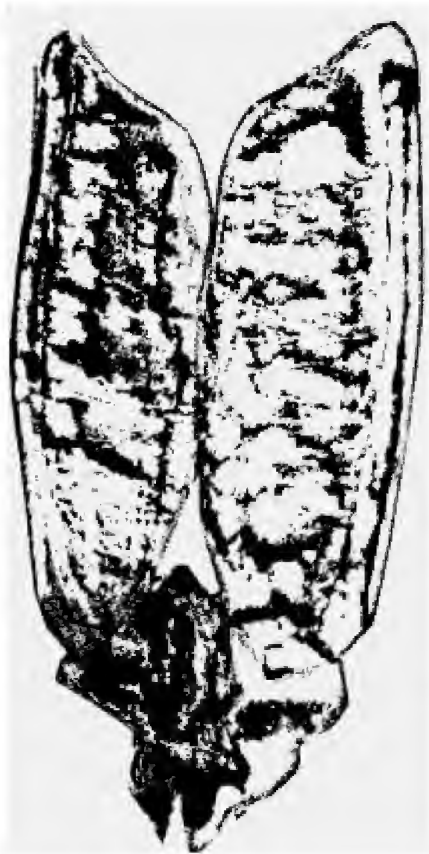
Pollinia apex type: T

Caudicle bulb: C

Retinacula character: E/LS

Hoya crassicaulis Elmer ex Kloppenburg 1995

Flowered in Fresno, CA. from clone #89053 DH.



Magnified approximately 165x.

Pollinium

length: 0.53 mm
widest: 0.15 mm

Retinaculum

length: 0.19 mm
shoulder: 0.08 mm
waist: 0.06 mm
hip: 0.09 mm
ext.: 0.05 mm

Translators

length: 0.19 mm
depth: 0.02 mm

Caudicle

bulb diam.: 0.05 mm

Translator/caudicle type: p/o

Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: S

Hoya sp. Nagtabon, Palawan 1995

Flower in Vitro, Yellow.



Pollinarium enlarged about 165x. The retinaculum here is long and narrow typical of many Philippine and Borneo hoyas species. The translators are placed well down the retinaculum.

Pollinium

length	0.53 mm
widest	0.16 mm

Retinaculum

length	0.23 mm
shoulder	0.08 mm
waist	0.04 mm
hip	0.08 mm
ext.	0.02 mm

Translator

length	0.09 mm
depth	0.04 mm

Caudicle

bulb diameter	0.09 mm
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Translator/caudicle type: p/o

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: E

Hoya finlaysonii Wight 1834

from Kim Yap collected Jahore State, Western Malaysia May 2003



This is a digital microscope picture of the pollinarium enlarged about 80X. I have at this time not learned to get the digital I can with a camera mounted monocular microscope. The pollinia outline shows the form but the detail in the retinaculum and translators is lacking. Below is the microscope picture.



Pollinia

length	0.52 mm
Widest	0.20 mm

Retinacula

length	0.15 mm
shoulder	0.11 mm

waist	0.08 mm
hip	0.10 mm
ext.	0.05 mm

Translators

length	0.15 mm
depth	0.08 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: p/o

Pollinia apex type: RT

Caudicle bulb: G

Retinacula character: S

Hoya amoena subsp. bogorensis Green & Kloppenburg 2014



Pollinarium enlarged ca. 150x.

Pollinium

length 0.52 mm
widest 0.21 mm

Retinaculum

length 0.14 mm
shoulder 0.20 mm
waist 0.07 mm
hip 0.11 mm
ext. 0.05 mm

Translator

length 0.07 mm
wide 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
p/o

Pollinia end types: R

Caudicle bulb: C

Retinacula character: S

Hoya sp. 900129

Bloom from 9/8/93 collected at Catanduanes 63 flowers per cluster. Appears to be *Hoya crassicaulis*.



Pollinarium enlarged about 165x. Retinacula is tilted a little so difficult to make out details of the structure.

The best I can measure this: **Pollinium**

length	0.49 mm
widest	0.16 mm

Retinaculum

length	0.19 mm
widest	0.05 mm all nearly same width
ext.	0.05 mm

Translators ca. 0.05 mm long and 0.01 mm in depth. Caudicle bulb ca. 0.04 mm in diam.

Translator/caudicle type: p/o

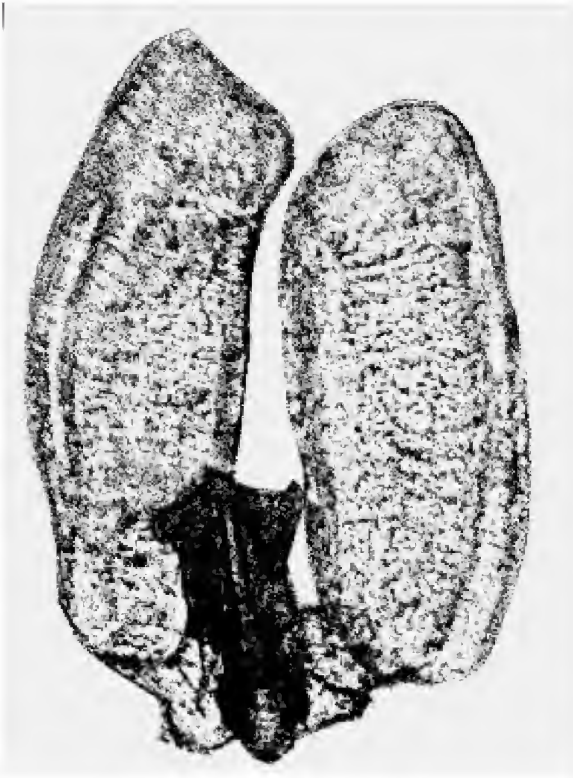
Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: S ?

Hoya sp. Edano (PNH) 14203 1951

Victoria Mts. Palawan, Philippines.



Magnified approximately 165x.

Pollinium

length: 0.48 mm
widest: 0.20 mm

Retinaculum

length: 0.18 mm
shoulder: 0.13 mm
waist: 0.05 mm
hip: 0.08 mm
ext.: 0.04 mm

Translators

length: 0.06 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.06 mm

Translator/Caudicle Type: p/o

Pollinia inner end type: RF

Caudicle bulb: G

Retinacula character: HU

Hoya sp. CAHUP 3935, Hernaez 2 March 1990



Pollinarium enlarged about 165x. This is very similar to that of *H. cardiophylla* and *H. crassicaulis*. Translators are attached near the base of the long retinaculum.

Pollinium

length	0.48 mm
widest	0.17 mm

Retinaculum

length	0.22 mm
shoulder	0.08 mm
waist	0.07 mm
hip	0.08 mm
ext.	0.02 mm

Translators

length	0.09 mm
widest	0.04 mm

Translator/caudicle type: p/o

Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: LS

***Hoya marlowii* Kloppenburg & Mendoza (unpublished) GM #15**



Pollinarium enlarged ca. 150x

Pollinium

length 0.47 mm
widest 0.14 mm

Translator/caudicle type: p/o

Pollinia end type: R

Retinaculum

length 0.18 mm
shoulder 0.09 mm widest
waist 0.05 mm
hip 0.08 mm
ext. 0.07 mm

Caudicle bulb: G

Translators

length 0.08 mm
widest 0.06 mm

Retinacula character: LS

Caudicle

bulb diam. 0.07 mm

Hoya Clemensiorum Green 2001

Type clone



The pollinarium enlarged about 165x. This is a beautiful structure, well defined and distinctive. The pollinia are well proportioned with a pellucid edge extending from the inner apex down the side to above the inner apex. The retinaculum is very long with narrow shoulder area tapering to a widened hip area and then narrowing considerably and the extensions are very short. Pollen grains are well defined, translators are broad in depth well structures supporting small clear caudicles.

Pollinia

length	0.47 mm
width	0.16 mm

Retinaculum

length	0.22 mm
shoulder	0.07 mm
waist	0.05 mm
hip*	0.06 mm
ext.	0.02 mm

Translators

length	0.11 mm
depth	0.05 mm

Caudicle

bulb diam.	0.05 mm
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Granulate

*Double hip present, lower 0.098 mm very broad.

Translator/caudicle Type: p/o

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: E

Hoya sp. Long Miao #1405 8/25/00

Flowers from Ted Green 9/7/00

Pollinarium enlarged about 165x. Retinacula very long and narrow. Translators are D shaped with narrow cupped tops.



Pollinia

length	0.47 mm
widest	0.14 mm

Retinaculum

length	0.26 mm
shoulders	0.06 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.02 mm

Translators

length	0.08 mm
depth	0.05 mm

Caudicle bulb diam. 0.04 mm

In this instance the retinaculum seems to have a more rounded wider head than the pollinarium above, this may be due to focal length at exposure.



Pollinium

length	0.51 mm
widest	0.17 mm

Retinaculum

length	0.20 mm
shoulder	0.11 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.10 mm

Translators base almost perpendicular

length	0.10 mm
widest	0.03 mm

Caudicle

bulb diameter 0.05 mm

Translator/caudicle type: p/o
Pollinia end type: T

Caudicle bulb: G
Retinacula character: E

Hoya marlowii Kloppenburg & Mendoza

(unpublished) GM #38



Pollinarium enlarged ca. 150x

Pollinium

length	0.47 mm
widest	0.14 mm

Retinacula: LS

Translator/caudicle type: p/o

Pollinia end type: R

Retinaculum

length	0.18 mm
shoulder	0.09 mm
waist	0.05 mm
hip	0.08 mm
ext.	0.07 mm
length	0.08 mm

Translators

length	0.08 mm
widest	0.06 mm

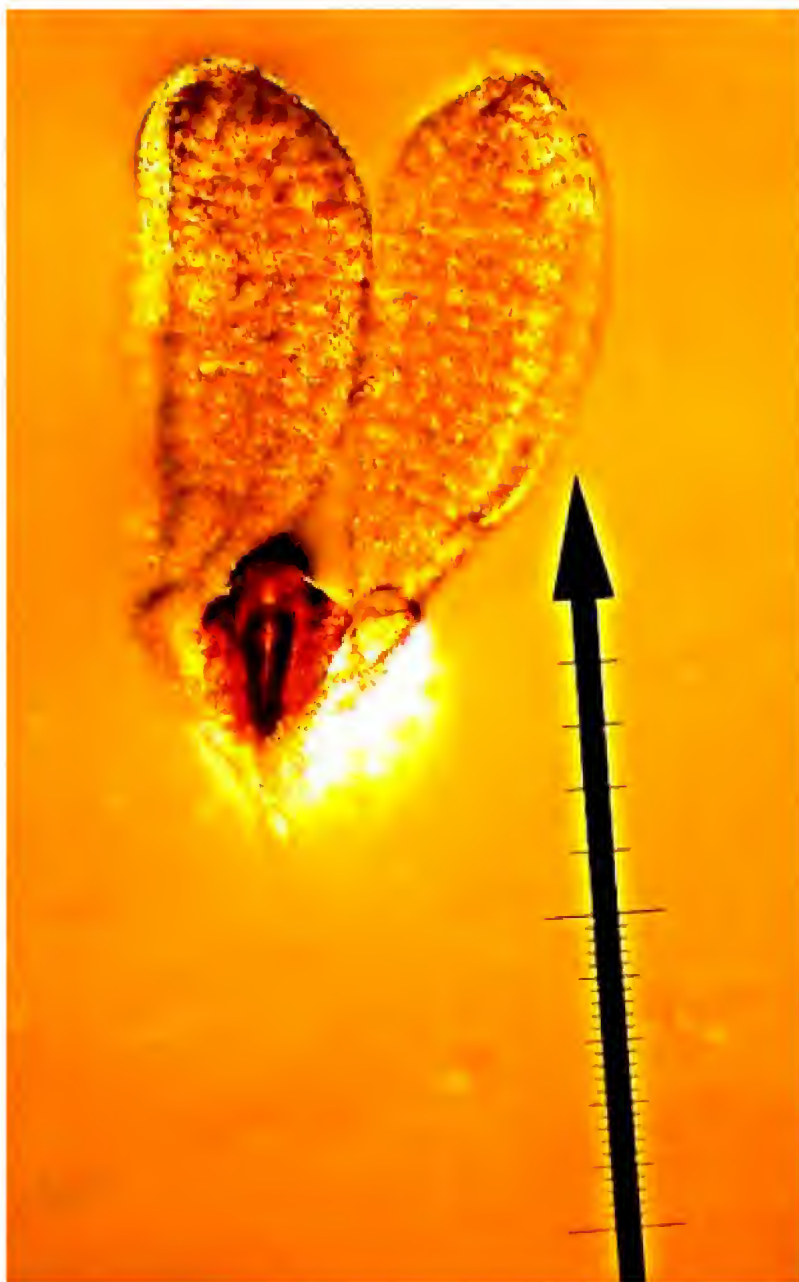
Caudicle

bulb diam.	0.07 mm
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Caudicle bulb type: G

Hoya lavacensis Kloppenburg, Guevarra & Carandang

(unpublished) #2012-4-034



Pollinarium enlarged ca.
151x.

Pollinium:

length	0.46 mm
widest	0.18 mm

Retinaculum:

length	0.14 mm
shoulder	0.12 mm
tapering to extensions	
ext.	0.03 mm

Translator:

length	0.10 mm
depth	0.03 mm

Caudicle:

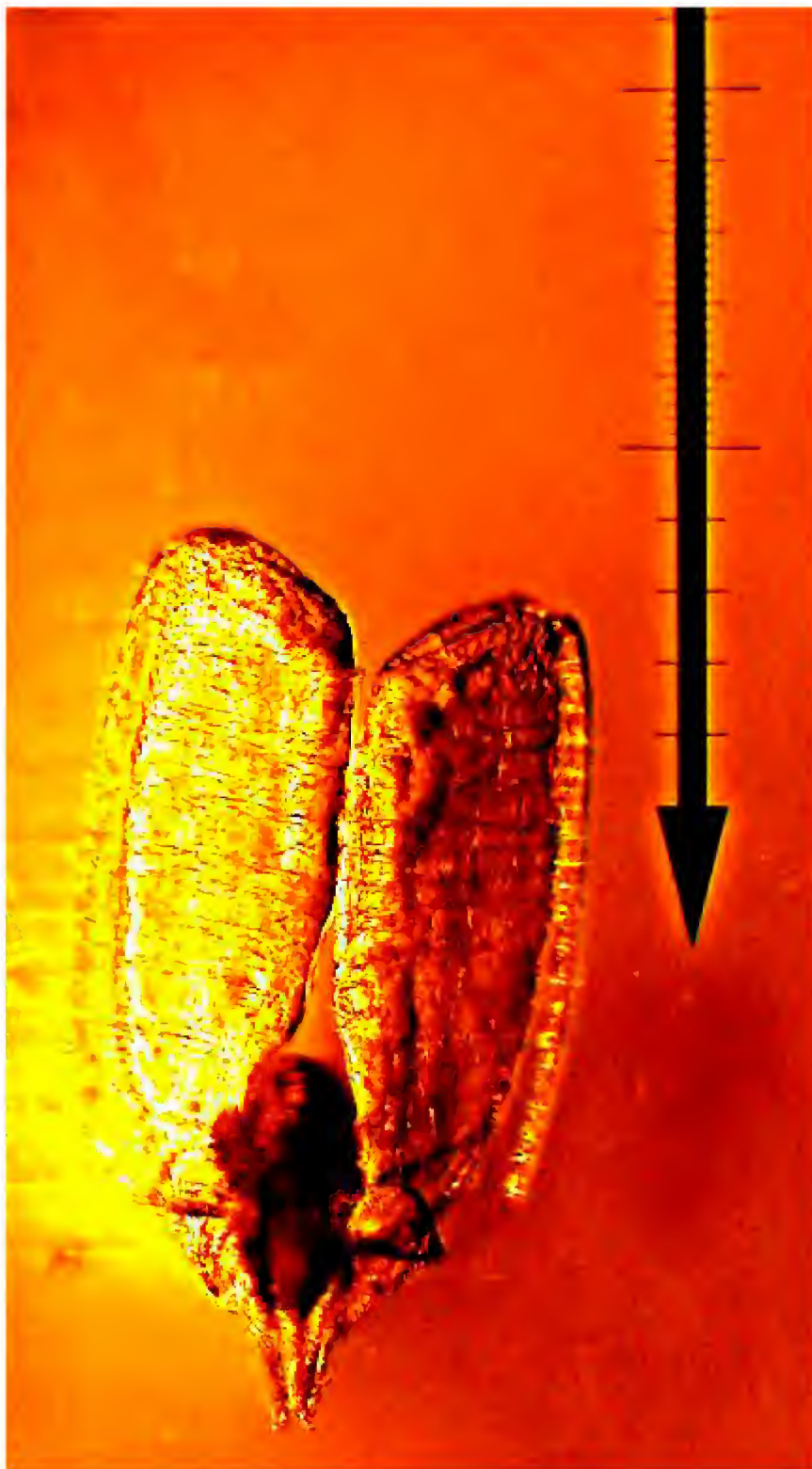
bulb diam.	0.04 mm
granulate	

Translator type: p/o

Pollinia inner end type:
T

Retinacula character: S

Hoya ilagiorum Kloppenburg & Siar 2011



Enlarged ca. 200x.

Pollinium

length 0.45 mm
widest 0.17 mm

Retinaculum

length 0.17 mm
shoulder 0.12 mm
waist 0.05 mm
hip 0.07 mm
ext. 0.10 mm

Translator

length 0.06 mm
depth 0.03 mm

Caudicle

bulb diam. 0.05 mm

Arrow head
represents 0.1 mm
In photo it is ca. 2
cm long.

**Retinacula
character: R**

Caudicle bulb: G

Translator/caudicle type: p/o

Pollinia inner apex type: T

Hoya marlowii subsp. polilloensis Kloppenburg & Mendoza

(unpublished) GM #171



Pollinarium enlarged 150x.

Pollinium

length 0.45 mm
widest 0.15 mm

Retinaculum

length 0.20 mm
widest 0.11 mm
narrowest 0.08 mm
extensions 0.05 mm

Translator

length 0.09 mm
widest 0.06 mm

Caudicle

bulb diam. 0.07 mm

Translator/caudicle type:
p/o

Pollinia inner apex type:
RT

Caudicle bulb: C

Retinacula character: LS

Hoya lucbanensis subsp. papillata Kloppenburg & Mendoza

(unpublished) GM #173



Pollinarium enlarged 180x.

Pollinium

length	0.44 mm
widest	0.20 mm

Retinaculum

length	0.17 mm
shoulder	0.10 mm
waist	0.05 mm
hip	0.07 mm
ext.	0.03 mm

Translator

length	0.09 mm
widest	0.03 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type:
p/o

Pollinia apex type: RT

Caudicle bulb: C ?

Retinacula character: HE
?

Hoya lucbanensis Kloppenburg & Mendoza

(unpublished) GM #129



Pollinarium
enlarged ca. 170x.

Pollinium

length 0.43 mm
widest 0.17 mm

Retinaculum

length 0.19 mm
shoulder 0.10 mm
waist 0.05 mm
hip 0.07 mm
ext. 0.04 mm

Translator

length 0.16 mm
widest 0.04 mm

Caudicle

bulb diam. 0.06 mm

Translator/caudicle type: p/o

Retinacula character: 2S

Pollinia apex type: R

The pollen grains here are very fine. The retinaculum is long with an unusual head, and two shoulder areas.

Hoya velasioii Kloppenburg 2015

CAHUP 9136

Photos 14 November 2006 seems closest to *Hoya crassicaulis* Elmer ex Kloppenburg.



Pollinarium
enlarged about
165x.

Pollinium

length	0.43 mm
widest	0.14 mm

Retinaculum

length	0.15 mm
shoulder	0.08 mm
waist	0.07 mm
hip	0.08 mm
ext	0.06 mm

Translators

length	0.12 mm
depth	0.03 mm

Caudicle

bulb diam	0.05 mm
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Ratio: r/p 1.8

Translator/caudicle type: p/o

Retinacula type: LS

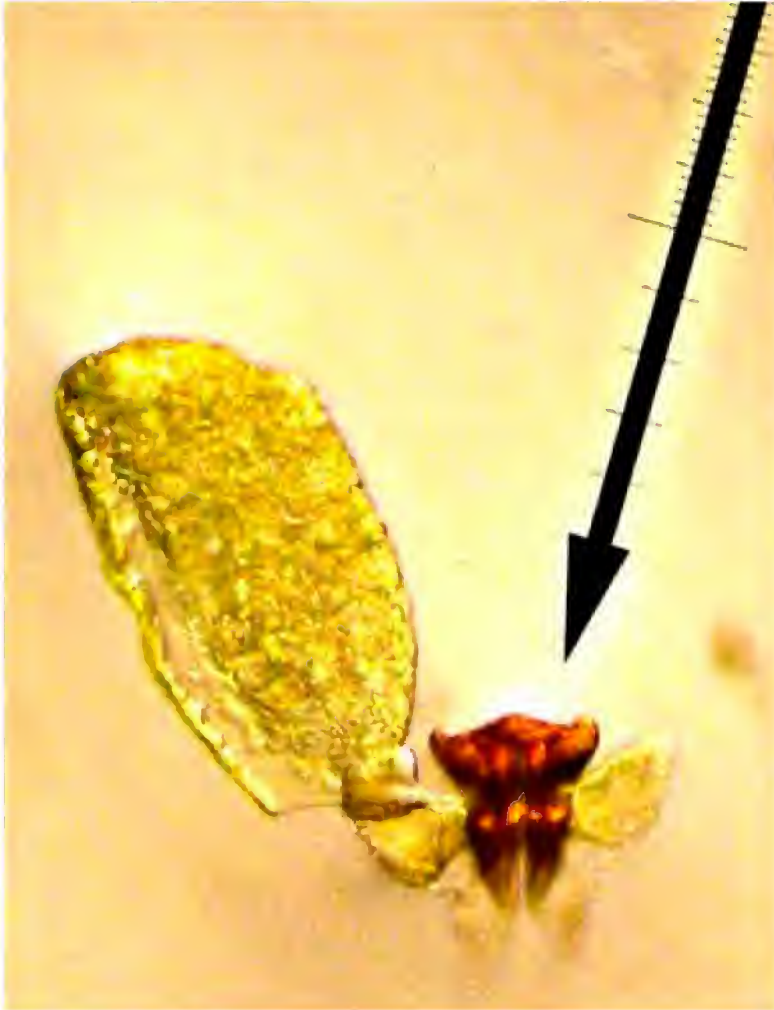
Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: LS

***Hoya blashernaezii* subsp *recurvula* Kloppenburg & Cajano**

(unpublished) AC #2



Pollinarium enlarged 150x.

Pollinium

length	0.42 mm
widest	0.21 mm

Retinaculum

length	0.11 mm
shoulder	0.15 mm
waist	0.06 mm
hip	0.09 mm
ext.	0.05 mm

Translator

length	0.10 mm
widest	0.06 mm

Caudicle

bulb	0.07 x 0.06 mm
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Translator/caudicle type:
p/o

Note: the horn like projections on the head of the retinaculum **Type:** HU.

The pollinia inner apex (top) are tapered “T” inward with rounded surfaces.

Caudicle bulb: C

Hoya blashernaezii subsp. grandiora Kloppenburg & Mendoza

(unpublished) GM #22



Pollinarium
enlarged ca. 200x.

Pollinium

length 0.40 mm
widest 0.18 mm

Retinaculum

length 0.12 mm
shoulder 0.12 mm
waist 0.06 mm
hip 0.10 mm
ext. 0.02 m

Translator

length 0.06 mm
length 0.08 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type: p/o

Pollinia end type: F

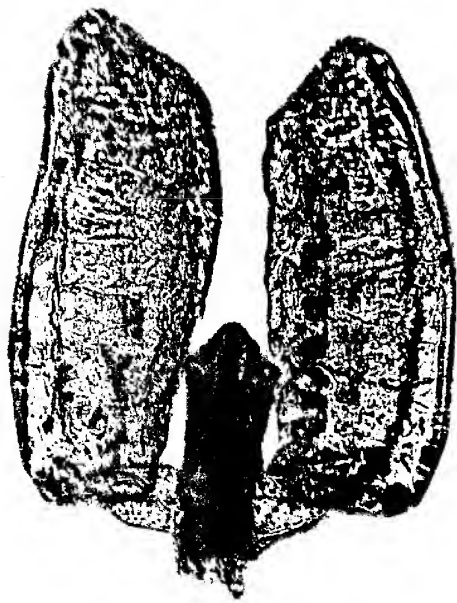
Caudicle bulb: G

Retinacula character: S

Hoya odorata Schlechter 1906

Flower from Elmer 18041 (PNH) 1917, Los Banos, Mt. Maquiling,
Laguna, Philippines.

Note: this pollinarium does not match the one from the (UC) sheet of the
same number. I believe this one is not from *H. odorata*. It appears to be *Hoya*
paziae.



Magnified approximately 165x.

Pollinium

length: 0.40 mm
widest: 0.15 mm

Retinaculum

length: 0.20 mm
shoulder: 0.08 mm
waist: 0.06 mm
hip: 0.07 mm
ext.: 0.04 mm

Translators

length: 0.08 mm
depth: 0.04 mm

caudicle

diam.: ?

Translator/caudicle type: p/o

Pollinia apex type: F

Caudicle bulb: G ?

Retinacula character: LS

***Hoya querinoensis* Kloppenburg & Siar 2007**

Apocinaceae subfamily Asclepiadoideae genus Hoya

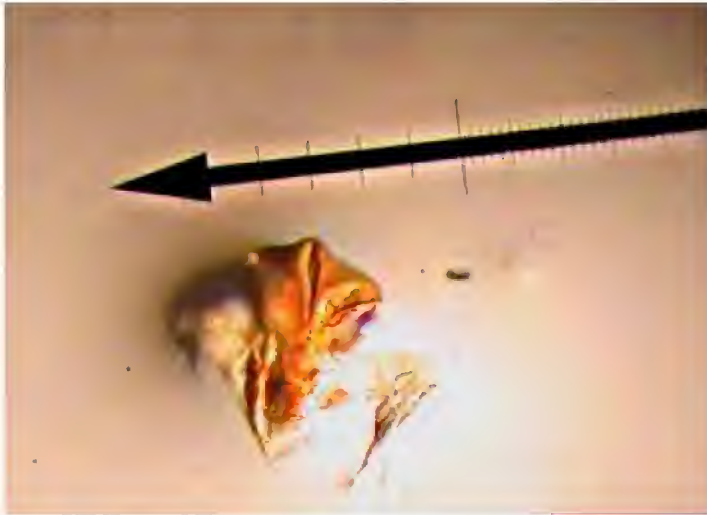


Photo with Epson digital camera of the retinaculum. Arrow is measurement scale. Head is 0.1 mm long.

Retinaculum:

length	0.20 mm
shoulder	0.15 mm
waist	0.06 mm
hip	0.10 mm
ext.	0.02 mm



Pollinium:

length	0.40 mm
widest	0.19 mm

Translators:

length	0.14 mm
depth ca.	0.03 mm

Ratio: ret/pol 1.8
poll width/length 2.14

Translator/caudicle type: d/o

Retinacula character: S

Pollinia apex type: R

Photo of an intact pollinarium.

Hoya blashernaezii subsp. aurantiaca Kloppenburg & Mendoza

Pollinarium enlarged about 200x. Retinacula turned on its axis.



Pollinia

length 0.39 mm
widest 0.20 mm

Translator/caudicle type: p/o

Pollinia inner end type: RT

Retinaculum

length 0.19 mm
shoulders 0.13 mm
waist 0.07 mm
hip 0.08 mm
ext. none visible

Caudicle bulb: C clear

Retinacula type: S

Translator

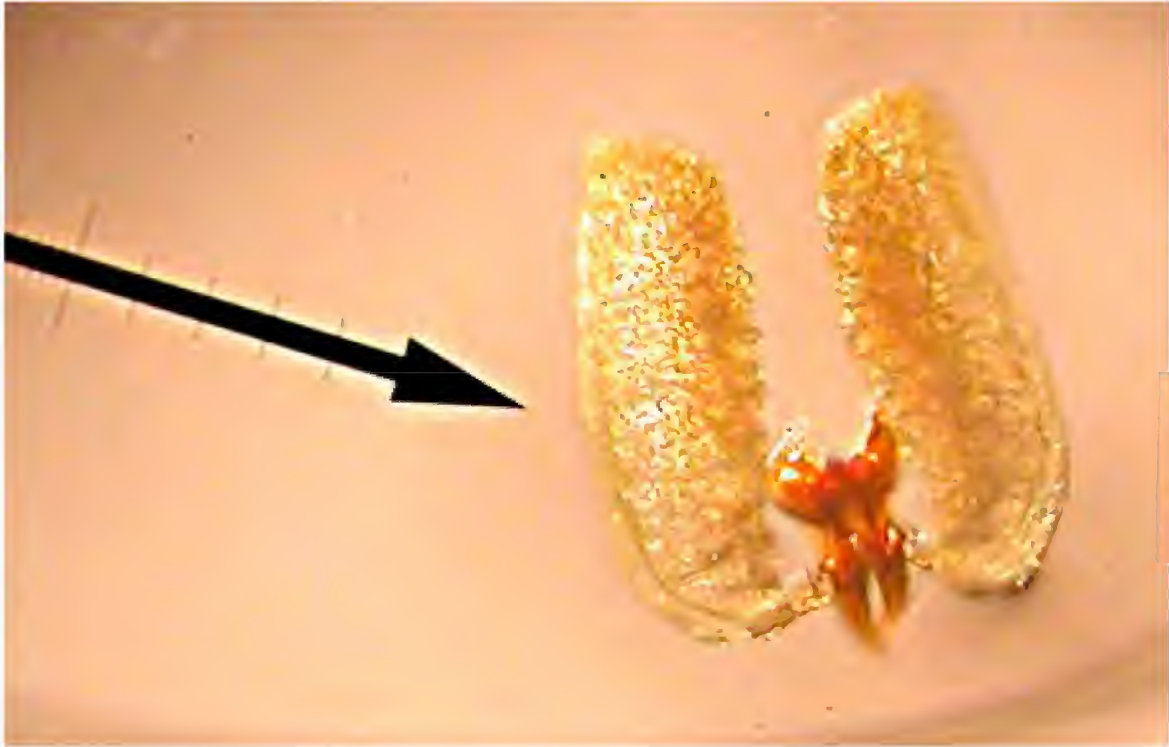
length 0.10 mm
widest 0.03 mm

Caudicle

bulb diam. 0.06 mm

Hoya columna Kloppenburg 2014

CAHUP #41193



Pollinarium

length	0.38 mm
widest	0.13-16 mm

Retinaculum

length	0.09 mm
shoulder	0.10 mm
waist	0.04 mm
hip	0.06 mm

Translator

length	0.08 mm
depth	0.02 mm

Caudicle

bulb diam.	0.04 mm oval.
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Translator/caudicle type: p/o ?

Retinacula character: HU

Pollinia end type: RT

Caudicle bulb: G

Ret:/Pol. ratio: 1:2.25

Hoya sp. CAHUP 63826



Pollinarium
enlarged about
165x.

Pollinium

length	0.38 mm
widest	0.15 mm

Retinaculum

length	0.16 mm
shoulder	0.07 mm
waist	0.03 mm
hip	0.07 mm
ext.	0.05 mm

Retinacula character: 2S

Caudicle bulb: C ?

Translators

length	0.05 mm
depth	0.02 mm

Translator/caudicle type: p/o

Pollinia inner apex type: R

Caudicle bulb. diam. 0.05 mm

Ratio: ret/poll 1.8; poll/width 2.5

Hoya sp. CAHUP 41945



The retinaculum has swiveled on the translator axis so the head is pointing up (right). A large retinaculum and small pollinaria.

Pollinium

length	0.37 mm
widest	0.16 mm

Retinaculum

length	0.20 mm
shoulder	0.13 mm
waist	0.04 mm
hip	0.06 mm
ext	0.01 mm

Translator

length	0.10 mm
depth	0.03 mm.

Caudicle not visible

Translator/caudicle type: p/o

Pollinia inner apex type: R

Caudicle bulb: ?

Retinacula character: S

Ratio: Ret./ Pol. 1:1.8

Hoya sp. NS 005

Via Monina Siar



The retinaculum here has a very broad head and my measurements of the length may be too long as it is difficult to determine where the How long the extensions are, overall length (length + extensions is correct). The translator and caudicle are difficult to separate. It appears even examining 5 pollinarium that the translators are somewhat delta shaped and the caudicles may have a granulate surface. I could not determine definitely.

Pollinarium enlarged ca. 165x.

Pollinium

length	0.37 mm.
widest	0.16 mm.

Translator/caudicle type: p/o

Retinaculum

length	0.18 mm.
shoulder	0.13 mm.
waist	0.08 mm.
hip	0.10 mm.
ext.	0.03 mm.

Pollinia inner end: R

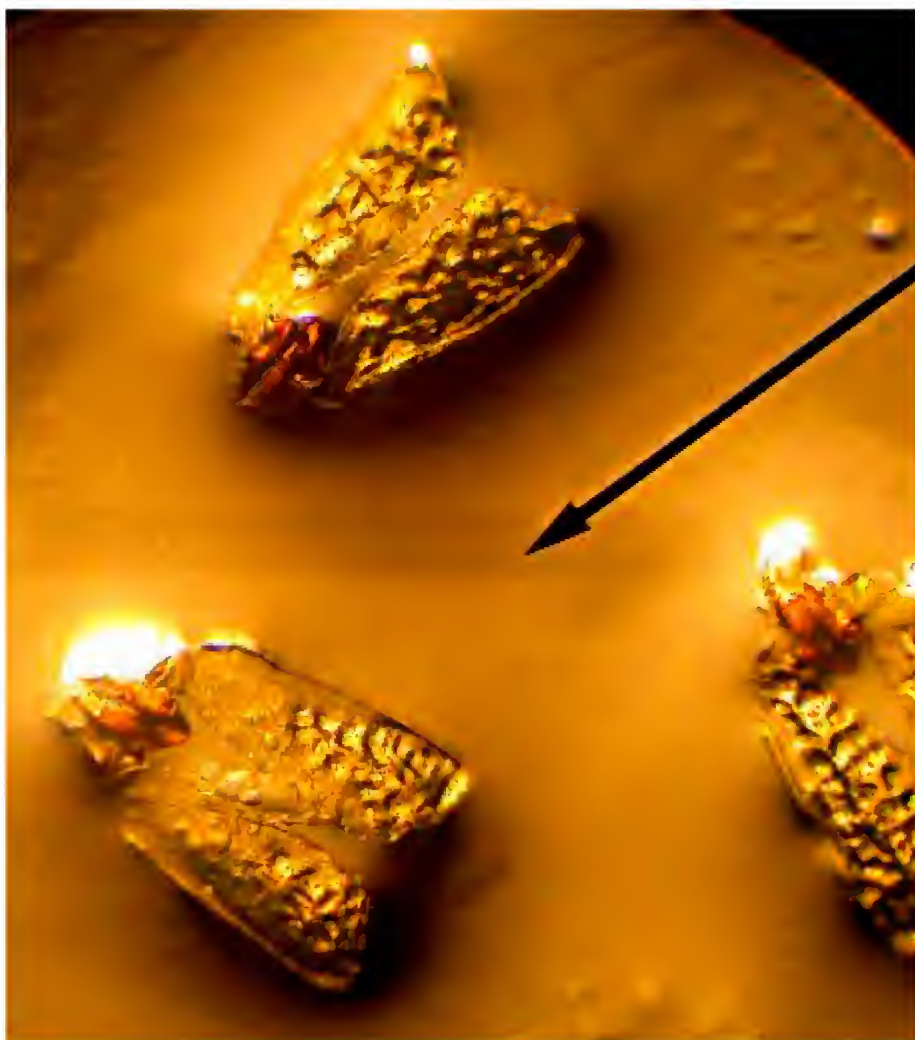
Caudicle bulb: G

Retinacula character: S

Translator

length	0.08 mm.	depth	0.04 mm.
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Hoya bebsguevarrae Kloppenburg & Carandang 2013



Pollinarium
above
enlarged ca.
100x.

Pollinium

length	0.35 mm
widest	0.12 mm

Caudicle

bulb diam.	0.05 mm
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Type: C

Retinaculum

length	0.10 mm
shoulder	0.08 mm
waist	0.06 mm
hip	0.07 mm
ext.	0.05 mm

Pollinia inner apex type: F

Retinacula character: S

Translator

length	0.08 mm
depth	0.02 mm

Translator type: p/o

Hoya bicolensis Kloppenburg, Siar & Cajano 2013

Pollinarium enlarged about 165x.



Pollinium

length	0.35 mm
widest	0.15 mm

Retinaculum

length	0.08 mm
shoulders	0.08 mm
waist	0.05 mm
hip	0.07 mm
extensions	0.01 mm

Translator

length	0.07 mm
widest	0.03 mm
depth	0.01 mm

Caudicle

bulb diam.	0.03 mm
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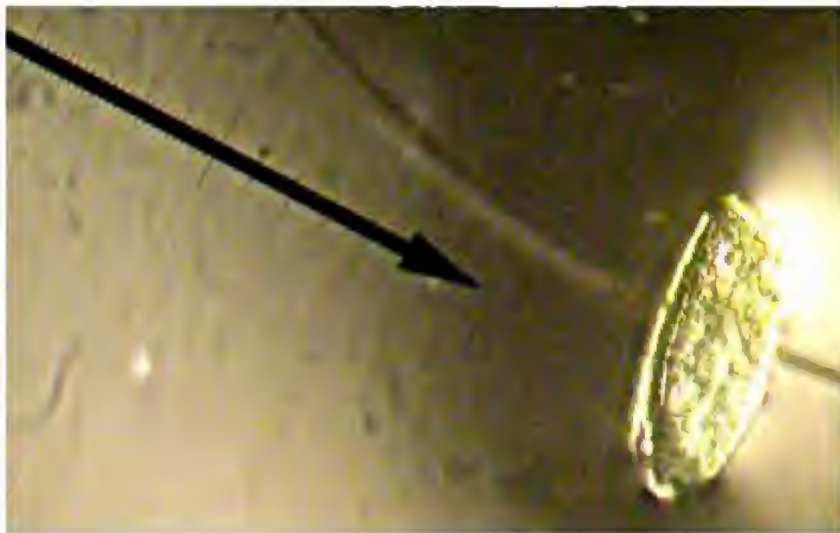
Ratios: p/r 4.4 p/w 2.3

Caudicle bulb: G ?

Translator/caudicle type: p/o

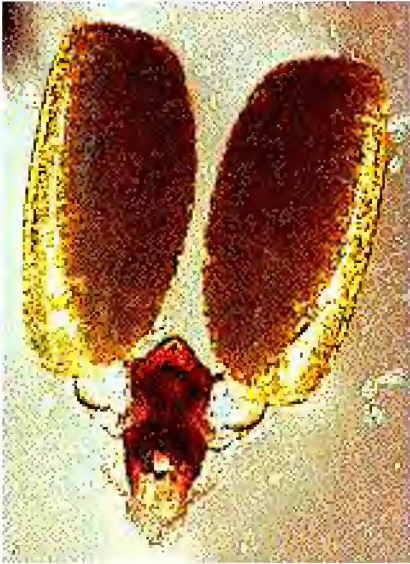
Retinacula character: S

Pollinia apex type: RT



Hoya nyhuusiae Kloppenburg 2003

Flower from Torill Nyhuus, Sweden. **Type clone.**



The pollinarium of this species is relatively small. Enlarged about 165x and then reduced 50% in scanning. The pollinia are broad and rounded at both ends. See the critical measurements above for details. The one thing I would have you note is the small horned projections from the head area of the retinacula which are unusual. The translators are narrow and the caudicles clear and bulbous.

Pollinia

length	0.29 mm
widest	0.13 mm

Retinaculum

length	0.11 mm long excluding extensions (0/03 mm).
head	0.07 mm with 0.01 mm projections,.
waist	0.04 mm wide
hip	0.07 mm wide

Translators

length	0.06 mm long curved upward semi-opaque.
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Caudicles

bulb diam.	0.05 mm clear.
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Translator/caudicle type: p/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Hoya subrosea Kloppenburg & Mendoza

(unpublished) GM #169



Pollinarium enlarged
200x.

Pollinium

length	0.28 mm
widest	0.15 mm

Retinaculum

length	0.09 mm
shoulder	0.08 mm
waist	0.05 mm
hip	0.07 mm
ext.	0.02 mm

Translator

length	0.08 mm
widest	0.03 mm

Caudicle

bulb diam.	0.03 mm
------------	---------

Translator/caudicle type:
p/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya pinnata Kloppenburg & Mendoza

(unpublished) GM #2



Pollinarium
enlarged ca. 250x.
The retinaculum
has turned on its
axis

Pollinium

length 0.28 mm
widest 0.12 mm

Retinaculum

length 0.10 mm
shoulder 0.07 mm
waist 0.04 mm
hip 0.08 mm
ext. 0.03 mm

Translator

length 0.07 mm
depth 0.02 mm

Caudicle

bulb diam. 0.03 mm

Translator/caudicle type: p/o

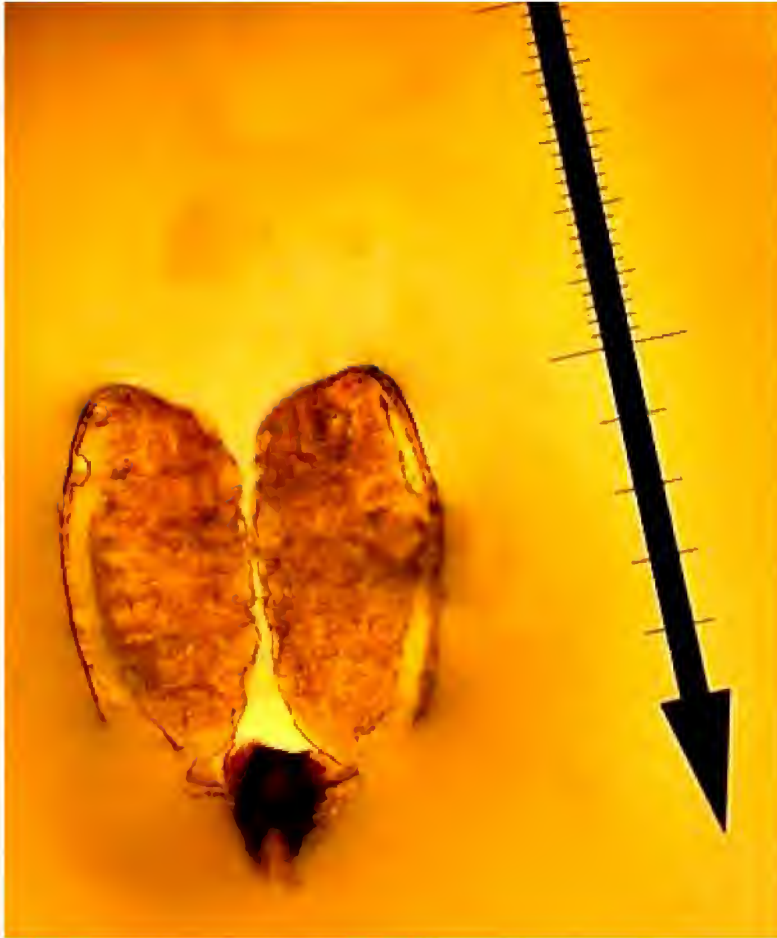
Pollinia end type: T

Caudicle bulb: ?

Retinacula character: S

Hoya unruhiana subsp. maubanensis Kloppenburg & Mendoza

(unpublished) GM #143



Pollinarium enlarged ca. 180x.

Pollinium

length 0.24 mm
widest 0.14 mm

Retinaculum

length 0.05 mm
shoulder 0.08 mm
waist 0.05 mm
hip 0.06 mm
ext. 0.04 mm

Translator

length 0.03 mm
widest 0.01 mm +

Caudicle

bulb diam. 0.04 mm

Translator/caudicle type:
p/o

Pollinia inner apex type:
T

Caudicle bulb: ?

Retinacula character: S

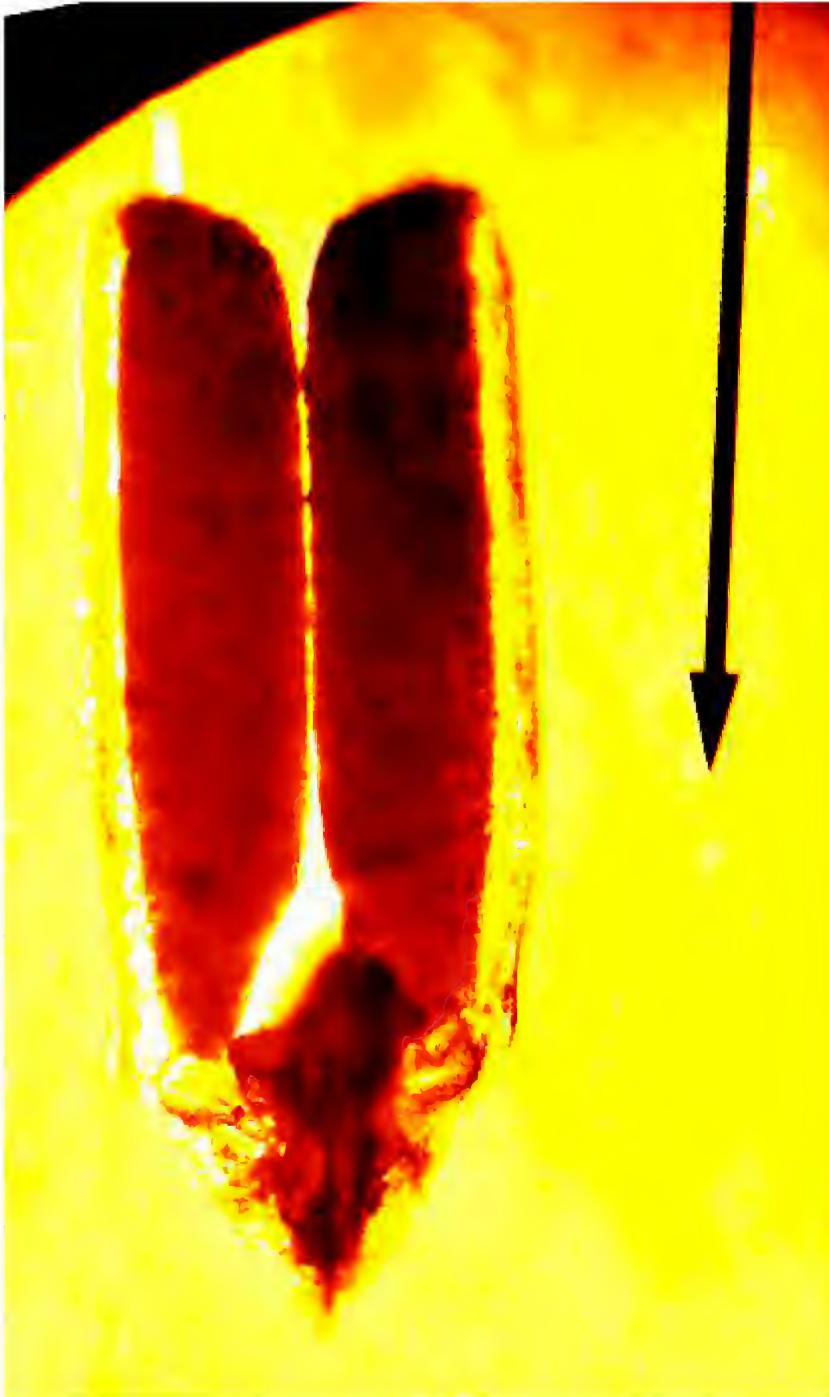
Pollinia Types 2017

d/o

1. **Hoya pubicorolla subsp. anthracina** Klopp., Ferreras & Mendoza 2013
2. **Hoya davaoensis** Kloppenburg 2013
3. **Hoya fuscomarginata** N. E. Brown 1901
4. **Hoya pachyclada** Kerr 1939
5. **Hoya as finlaysonii** Wight 1834
6. **Hoya pseudorigida** Kloppenburg, Siar
7. **Hoya cinnamomifolia** Hooker 1848
8. **Hoya paulshirleyi** Kloppenburg & Green 2010
9. **Hoya minibella** cultivated
10. **Hoya sp.** shephardell
11. **Hoya sp.** 80-03 Borneo
12. **Hoya sp.** USDA 354238
13. **Hoya sp.** NS05-162
14. **Hoya wibergiae** Kloppenburg 2001
15. **Hoya betchei** (Schltr.) Whistler
16. **Hoya recurvula** Kloppenburg 2000
17. **Hoya sp.** IPPS 7020
18. **Hoya sp.** ABG #12 NG
19. **Hoya sp.** Ben Vergara, #56
20. **Hoya juannguoana** Kloppenburg 2002
21. **Hoya sp.** DAV 819
22. **Hoya erythrina** Rintz 1978
23. **Hoya nagtabonensis** Kloppenburg
24. **Hoya vitellinia** Blume 1849
25. **Hoya citrina** Ridley 1922
26. **Hoya neobudica** Guillaumin 1937
27. **Hoya matavanuensis** Kloppenburg 2011
28. **Hoya deykeae** Green 1999 Type clone
29. **Hoya querinoensis** Kloppenburg & Mendoza
30. **Hoya shephardii** Short ex Hooker 1861
31. **Hoya purificacioniae** Kloppenburg & Siar
32. **Hoya sp.** USDA 354241
33. **Hoya surigaoensis** Kloppenburg, Simeona V. Siar & Torill Nyhuus 2010
34. **Hoya cardiophylla** Merrill 1920
35. **Hoya sp.** Here (UC) 1013 Colon (cardiophylla)
36. **Hoya benvergarai** Klopp. & Siar 2008
37. **Hoya graveolens** Kerr 1939
38. **Hoya isabelaensis** Kloppenburg, Siar & Ferreras 2011
39. **Hoya soligamiana** Kloppenburg & Siar 2009
40. **Hoya lambii** Green 2000
41. **Hoya xxxxxxxx** Kloppenburg & M. V. Siar
42. **Hoya pentaphlebia** Merrill 1918

43. **Hoya cagayanensis** Burton 1987
44. **Hoya butleriana** Kloppenburg, Siar, Guevarra & Carandang 2013
45. **Hoya aurigueana subsp. altocolora** Kloppenburg & Mendoza
46. **Hoya elsae** Kloppenburg & Mendoza
47. **Hoya marsianii** Kloppenburg & Mendoza
48. **clone 910301 collected by Blass Hernaez**
49. **Hoya cf. fitchii vial #20**
50. **Hoya blashernaezii ssp. valmayoriana** Klopp., Guev., & Carandang 2014
51. **Hoya crassicaulis** Elmer ex Kloppenburg 1995
52. **CAHUP #5297**
53. **Hoya palawanensis subsp. majora** Klopp., Siar, et al. 2012
54. **Hoya makatongensis** Kloppenburg & Mendoza
55. **Hoya marlowei subsp. infantaensis** Kloppenburg & Mendoza
56. **Hoya benvergarae** Kloppenburg & Siar 2008
57. **Hoya benvergarae subsp. gelba** Kloppenburg & Mendoza
58. **Hoya linapauliana** Kloppenburg, Siar & Mendoza
59. **Hoya linapauliana subsp. verida** Kloppenburg, Siar, Cajano
60. **Hoya linapauliana subsp. nakarensis** Kloppenburg & Mendoza
61. **Hoya palawanensis** Kloppenburg, Siar & Mendoza 2015
62. **Hoya palawanensis subsp. minora** Kloppenburg 2015
63. **Hoya sp. 2012-4-029**
64. **Hoya marvinii** Kloppenburg & Mendoza
65. **Hoya cajanoae** Kloppenburg
66. **Hoya aurigueana** Kloppenburg, Siar & Cajano 2013
67. **Hoya lagunaensis** Kloppenburg 2015
68. **Hoya cagayanensis** Burton 1987
69. **Hoya incrassata** Warburg 1904
70. **Hoya forbesii** King & Gamble 1903
71. **Hoya auripigmenta** Kloppenburg & Mendoza
72. **Hoya benstoneana** Klopp., Siar, Mendoza, Guevarra & Carandang 2013
73. **Hoya marizae** Kloppenburg & Mendoza
74. **Hoya persicina** Klopp., Siar, G. Mendoza, Guevarra & Carandang 2013
75. **Hoya persicina subsp. rosea** Kloppenburg, Mendoza & Ferreras 2013
76. **Hoya crassicaulis subsp. mendozae** Kloppenburg
77. **Hoya persicina subsp. inawaensis** Kloppenburg & Mendoza
78. **Hoya auripigmenta subsp. papillata** Kloppenburg & Mendoza
79. **Hoya cardiophylla** Merrill 1920
80. **Hoya velasioii subsp. grandiora** Kloppenburg 2015
81. **Hoya bicolor subsp. polilloensis** Kloppenburg & Mendoza
82. **Hoya alwitriana** Kloppenburg, Siar, Guevarra & Carandang 2012
83. **Hoya aurantiaca ssp. lagyoensis** Kloppenburg & Mendoza
84. **Hoya bakyaanensis** Kloppenburg & Mendoza
85. **Hoya sp. EG 06097**
86. **Hoya latifolia ?**
87. **Hoya armeniaca** Kloppenburg & Mendoza

Hoya pubicorolla subsp. anthracina Kloppenburg, Ferreras & Mendoza 2013



Pollinarium enlarged
ca. 180x.

Pollinium

length 0.83 mm
widest 0.20 mm

Retinaculum

length 0.26 mm
shoulder 0.20 mm
waist 0.10 mm
hip 0.16 mm
ext. 0.05 mm

Translator

length 0.10 mm
depth 0.03 mm

Caudicle

bulb diam. 0.08 mm

Translator/Caudicle
Type: d/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula
character: S

Ratios: p/w 4.2
p/r 5.2

Flowers in globose clusters of ca. 28 flowers.

Hoya davaoensis Kloppenburg 2013

Pollinarium

Pollinium

length	0.80 mm
widest	0.25 mm

Retinaculum

length	0.20 mm
shoulder	0.15 mm
waist	0.10 mm
hip	0.12 mm
ext.	0.03 mm

Translators

length	0.15 mm
depth	0.04 mm

Caudicle

bulb diam.	
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Translator/caudicle type: d/o

Pollinia end type: RT

Retinacula character: S



Hoya fuscomarginata N. E. Brown 1901



Pollinarium enlarged about 82x.

Pollinia

length	0.75 mm
widest	0.17 mm

Retinaculum

length	0.17 mm to the extensions
shoulder	0.10 mm
waist	0.05 mm
hips	0.09 mm
extensions	0.05 mm

Translator

length	0.08 mm
width	0.02 mm
depth	0.04 mm

Caudicle

bulb diameter	0.06 mm
---------------	---------

Translator/caudicle type: d/o

Pollinia end type: RT

Caudicle bulb: G

Retinacula character: HE

There is a little indent in the retinacular shoulder, head tapers from the shoulder to a point (coolie hat fashion), extensions are rather long and heavy.

Hoya pachyclada Kerr 1939

Flower from clone 574 flowered in Fresno, CA. USA.



translators are fairly uniform in width and attached at the waist area supporting rather small caudicles; they extend on down to cover the sides of the hip area. The head portion of the dark retinaculum is rather long and the shoulder fairly prominent.

Pollinia

length 0.75 mm
widest 0.28 mm uniform width, pellucid

edge from top to inner

apex with little or no vacuole visible, apex rounded evenly.

Retinaculum

length	0.35 mm
shoulder	0.15 mm
waist	0.07 mm
hip	0.13 mm
extensions	0.06 mm

Translators

length	0.21 mm
depth	0.02 mm

Caudicle

bulb diameter 0.10 mm

Translator/caudicle type: d/o

Pollinia end type: R

Caudicle Bulb: G

Retinacula character: HE

Hoya as finlaysonii Wight 1834

From Chanin Thorut collected in S. Thailand Flowered in Fresno CA June 2000



This is a composite of 3 pictures of a pollinarium enlarged about 165x. Upper left a little out of alignment. This shows the smoothly rounded apices of the pollinia. Details of the pellucid edge and vacuoles are plainly visible, as is the small portion of the nearer apex attached to the caudicle. The translators here are strongly structured and both these and caudicles are attached well down on the retinacula which has a tendency to make the retinaculum swivel on this axis.

Pollinarium: large and well developed, translators and caudicle attached well down on the long retinaculum.

Pollinia:

length	0.75 mm
width	0.26 mm

Retinaculum

length	0.27 mm
shoulders	0.18 mm
hip	0.10 mm

Translator

length	0.16 mm
widest	0.06 mm

Caudicles

bulb diam.	0.07 mm
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Translator/caudicle type: d/o

Pollinia end type: T

Caudicle Bulb: G (granulate)

Retinacula character: HE

Hoya pseudorigida Kloppenburg, Siar,
(unpublished)



Pollinarium enlarged
ca. 150x.

Pollinium

length 0.75 mm.
widest 0.25 mm.

Retinaculum

length 0.25 mm.
shoul. 0.19 mm.
waist 0.10 mm.
hip 0.12 mm.
ext. 0.06 mm

Translator

length 0.10 mm.
wide 0.04 mm.

Caudicle

B diam. 0.08 mm.

Translator/caud.:

d/o

Pollinium

length/width ratio
3.1

length/ret length
2.8

Pollinia end type:

RF

Caudicle Bulb: C

Retinacula
character: HE

Hoya cinnamomifolia Hooker 1848
Flower via Ann Wayman, Central Point, OR. USA.



The one on the left is a bottom view and the right one a top view, both are pretty much the same except for what is visible of the retinaculum. This shows that the structure is dimensional. the left one shows the translators and the caudicle entering the side cavities in the low waist areas. And the head here appears elongated. In order to study Pollinarium, one must make comparisons of the same view of all Pollinaria And focus up and down to determine their true structure. Nearly all my

photos are of the top view of the retinaculum for comparative purposes. The bulbous caudicles are plainly visible on the left subject.

Pollinium

length	0.72 mm
widest	0.27 mm long fairly large vacuole inside from the sterile pellucid edge.

Retinaculum

length	0.30 mm to crotch, hear rounder on top.
shoulders	0.20 mm wide.
waist	0.12 mm wide
hips	0.22 mm

Translator

length	0.17 mm
depth	0.05 mm thickest near base.

Caudicle

bulb. diam.	0.08 mm.
-------------	----------

Translator/caudicle type: d/o

Retinacula character: HE

Pollinia inner end type: RT

Caudicle bulb: G

Hoya paulshirleyi Kloppenburg & Green 2010



Pollinarium
enlarged about
165x.

Pollinium

length	0.71 mm
widest	0.20 mm

Translator/caudicle type: d/o

Retinaculum

length	0.18 mm
shoulder	0.12 mm
waist	0.05 mm
hip	0.09 mm
ext.	0.02 mm

Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: HE

Translators

length	0.10 mm
width	0.05 mm
depth	0.01 mm

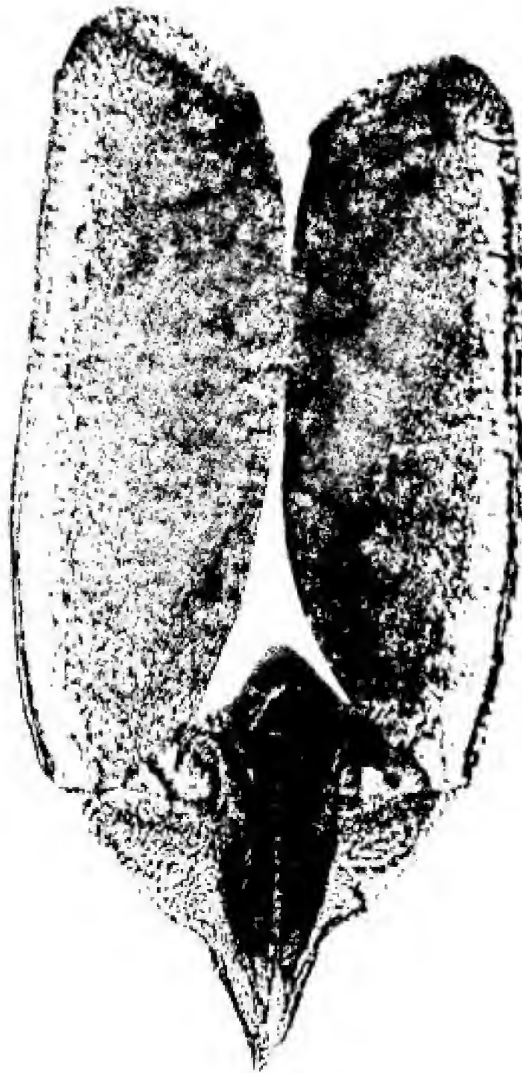
Caudicle

bulb diam.	0.07 mm
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Hoya sp. shephardell

Grown and flowered in Fresno, CA.

Magnified approximately 165x.



Pollinium

length: 0.65 mm
widest: 0.21 mm

Retinaculum

length: 0.24 mm
shoulder: 0.15 mm
waist: 0.08 mm
hip: 0.10 mm
ext.: 0.06 mm

Translators

length: 0.14 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.06 mm

Translator/caudicle type: d/o

Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: S

Hoya sp. 80-03 Borneo

Flower via MM.



Magnified approximately 165x.

Pollinium

length: 0.65 mm
widest: 0.21 mm

Retinaculum

length: 0.14 mm
shoulder: 0.14 mm
waist: 0.08 mm
hip: 0.12 mm
ext.: 0.04 mm

Translators

length: 0.12 mm
depth: 0.03 mm

Caudicle

bulb. diam.: 0.07 mm

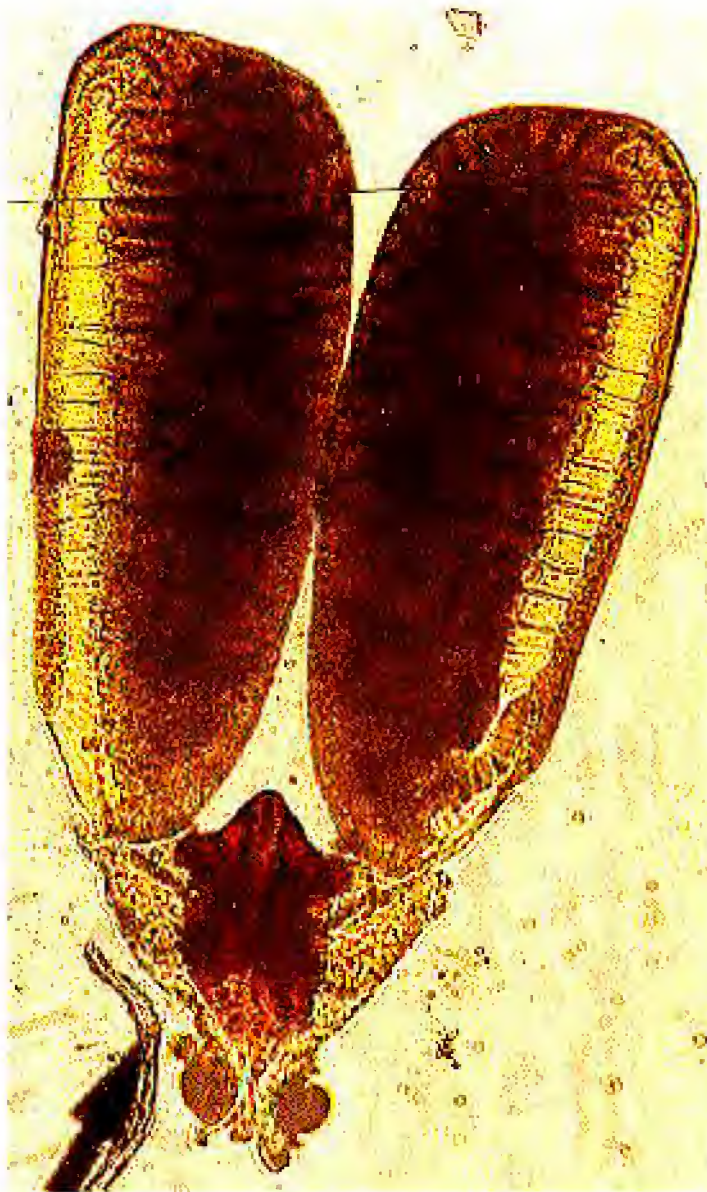
Translator/caudicle type: d/o

Pollinia inner end type: R (round)

Caudicle bulb: G

Retinacula character: R

Hoya sp. USDA 354238
Grown and flowered in Fresno, CA



The pollinarium enlarged about 165x. This is a large pollinarium. The pellucid edge starts over the top of the pollinia and runs down the outside edge but not clear to the inner apex. There is a distinct vacuole, fairly wide just inside from this edge. The translators are broad and well developed supporting relatively small clear caudicles. The retinaculum is broad and short.

Pollinia

length	0.64 mm
width	0.26 mm

Retinaculum

length	0.19 mm
shoulder	0.14 mm
waist	0.07 mm
hip	0.09 mm
extensions	0.06 mm

Translators

length	0.12 mm
depth	0.06 mm

Caudicle

bulb diameter	0.06 mm
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Translator/caudicle type: d/o

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: S

Hoya sp. NS05-162

Flowers in Kew solution from Torill Nyhuus June 2007, data 27 June 2007



Pollinarium enlarged about 125x.

Pollinium

length	0.63 mm
widest	0.22 mm

Retinaculum

length	0.21 mm
shoulder	0.14 mm
waist	0.07 mm
hip	0.10 mm
ext.	0.08 mm

Translator

length	0.12 mm,
depth	0.03 mm
wide	0.01 mm

Caudicle

bulb diam	0.06 mm
clear	

Translator/caudicle type: d/o

Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: HE

Hoya ubudensis Kloppenburg & Yap 2010 Type clone



Pollinarium enlarged ca. 165x to show more detail of the translator type.

Pollinium		Translator/caudicle type: d/o	
length	0.60 mm	Pollinia end type: R	
widest	0.21 mm		
Caudicle bulb: 0.05 mm		Ratio: pollinium length/ret. 2.8	
		Ratio: pollinium length/width 2.8	
		Delta shaped, surface granulate.	
Retinaculum			
length	0.16 mm		
shoulder	0.11 mm		
waist	0.06 mm		
hip	0.08 mm		
ext.	0.05 mm		
Translator			
length	0.10 mm		
deepest	0.05 mm		

Hoya wibergiae Kloppenburg 2001

Plant grown and flowered in Fresno, CA. USA.



Pollinarium enlarged about 165x.
The jagged edge on the inner side of the pollinia may be due to drying. The pellucid edge here begins well in on the top of the pollinia at the division between the vacuoles and pollen and seems to extend all the way to the other apex. The translators are wedge shaped, not well defined, whereas the caudicle, usually clear, is here more opaque and relatively small. The retinaculum is large with a rounded head broad shouldered and tapers to the apex from there with extensions not well separated.

Pollinarium:

Pollinia

length 0.60 mm

widest 0.21mm

apex truncate but tapering inwardly.

Pellucid edge extending from outer apex to near the inner apex, vacuoles not well defined.

Retinaculum:

head domed 0.23 mm long.

shoulders 0.15 mm wide

waist 0.10 mm wide

hip 0.11 mm

extensions narrowing to sharp apex, close together. 0.08 mm. long with much undifferentiated material.

Translators wedge shaped.

length 0.15 mm

widest 0.05 mm

attached below waist.

Caudicle dense (not clear)

bulb ca. 0.6 mm in diameter.

Translator/caudicle type: d/o

Pollinia inner end type: F

Caudicle bulb: G

Retinacula character: R

Hoya betchei (Schltr.) Whistler

May be correct but retinacula large. W344

Collected by Dr. Whistler, 12 July 1980, elev. 550m Upolu, Samoa



Pollinarium enlarged about 165x. I could not get the whole structure together.

Pollinium

length	0.60 mm
widest	0.25 mm

Retinaculum

length	0.29 mm
shoulders	0.20 mm
waist	0.09 mm
hip	0.15 mm
extensions	0.07 mm

extensions are undifferentiated.



Use the dark arrow as a reference for size. The head is 0.1 mm long, base 0.05 mm wide and stem is 0.02 mm. wide. Species with retinacula this long are *H. imperialis*, *H. thompsonii*, & *H. cinnamomifolia*; they are in the upper range of sizes. The length is from the top of the head to the crotch where the extensions begin.

Translator/caudicle type: d/o

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: HU

H. betchei (Schltr.) Whistler.

Hoya recurvula Kloppenburg 2000



A view of the pollinarium enlarged about 165x.

Pollinarium: Very long rather narrow pollinia, outer apex rounded and tapering inward.

Pellucid margin on outside with a small tapering vacuole. Retinacula large, heavy thick translators and small amber nearly clear caudicles.

Pollinia

length	0.59 mm
widest	0.25 mm

Retinacula

length	0.25 mm
shoulders	0.12 mm
hip	0.09 mm
waist	slightly wider

Translators

length	0.13 mm
depth	0.07 mm granular surface.

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: d/o

Pollinia inner end type: RT

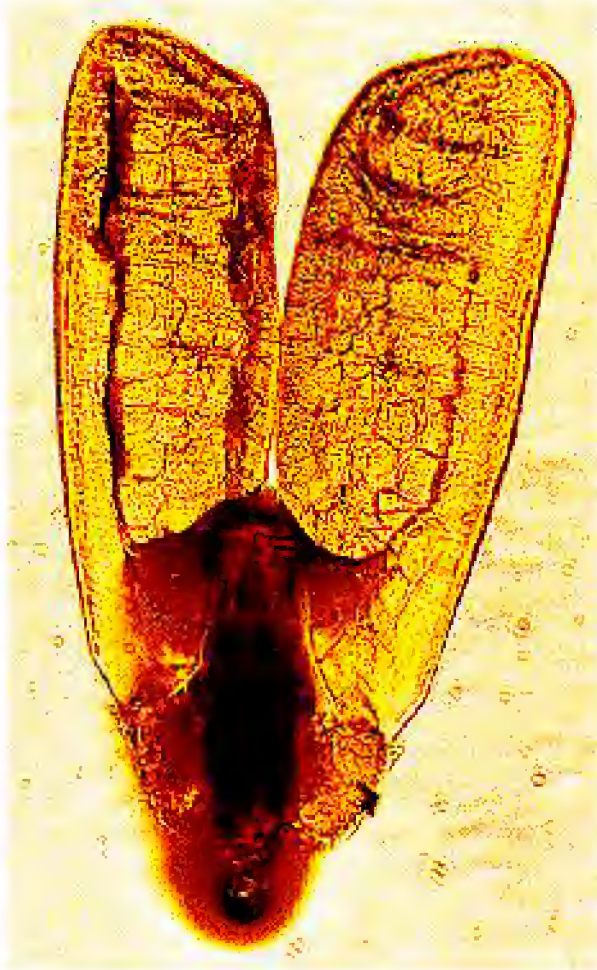
Caudicle bulb: G

Retinacula character: R

Hoya sp. IPPS 7020

Flowers via Ted Green, possibly *Hoya vitellinoides* Brink f.

If the type sheet material I received from Chris Burton (see under Passport to *Hoya vitellinoides*) is correct then I do not think this identification is correct but must be related see the pollinaria of all.



View of the pollinarium enlarged about 165x. The pollinia here are rather broad. Much shorter than in the type material for *H. vitellinoides* Bakh, f. Notice the sort of unconsolidated pollen in the lower ends and what appears to be very broad vacuoles. The retinaculum head is rather long and narrow. Translators appear to be attached well down on the retinaculum.

Pollinium

length: 0.58 mm
widest: 0.20 mm

Retinaculum

length: 0.25 mm
shoulder: 0.12 mm
waist: 0.07 mm
hip: 0.08 mm
ext.: 0.08 mm

Translators

length: 0.13 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.04 mm
possibly opaque granulate

Translator/caudicle type: d/o

Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: HU



Hoya sp. ABG #12 NG

Flowered in Fresno, CA.

Magnified approximately 165x.



Pollinium

length	0.58 mm
widest	0.22 mm

Retinaculum

length	0.22 mm
shoulder	0.12 mm
waist	0.07 mm
hip	0.11 mm

Translators

length	0.10 mm
depth	0.04 mm

Caudicle

bulb diam.	0.06 mm
------------	---------

Translator/caudicle type: d/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: HE

Note the pollinarium is similar to H. sp. USDA 354238 but somewhat smaller.

Hoya sp. Ben Vergara, #56



Pollinarium enlarged about 165x

Pollinium

length	0.57 mm.
widest	0.23 mm.

Retinaculum

length	0.12 mm.
shoulder	0.10 mm.
waist	0.04 mm.
hip	0.08 mm.
ext.	0.06 mm.

Translators

length	0.12 mm.
widest	0.04 mm.

Caudicle

bulb diam.	0.05 mm.
------------	----------



A little sharper picture of the retinaculum. Pellucid germinal edge extends over inner edge and down outside to the base but not around the apex. Outer apices are rounded tapering inward slightly.

The translators are attached below the waist.

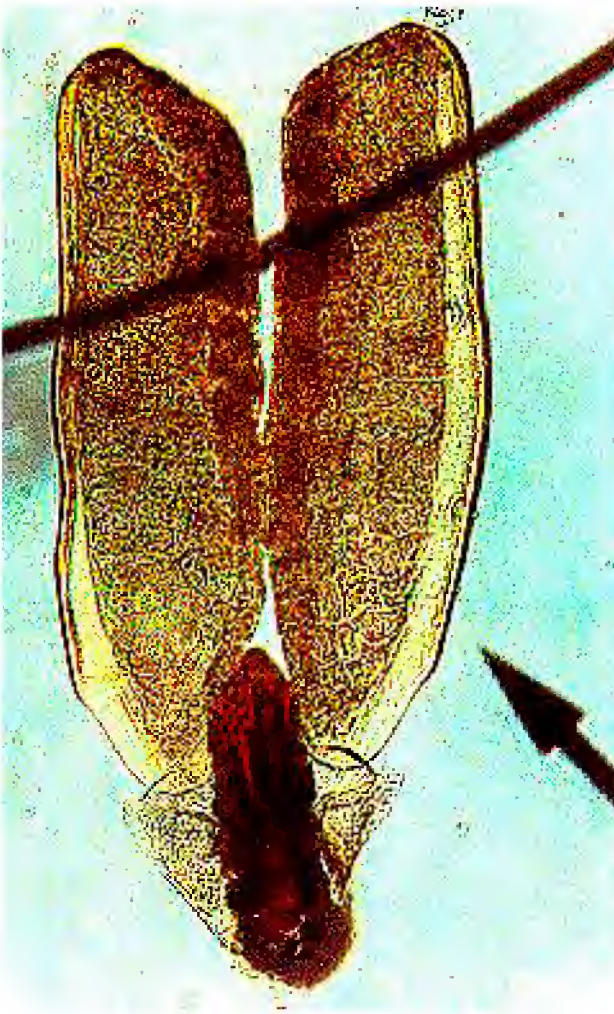
Translator/caudicle type: d/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Hoya juannguoana Kloppenburg 2002



Pollinarium enlarged about 165x. The dark circular line is a circular area containing a 1 mm scale on the mounting slide. The arrow head in the lower right is 0.10 mm long.

Note: The dark retinaculum is rather long and narrow, translators are especially well developed, supporting a clear bulbous ended caudicle into which the lower end of the pollinia stick. The pellucid margin on the pollinia do not extend near the attached apex. outer apex of pollinia (this is the end nearest the flower center) is truncated inwardly, the vacuole is clear and devoid of extraneous material for the most part.

Pollinarium: long pollinia and narrow ends truncate; long retinaculum, well developed translator arms supporting large clear caudicle bulb.

Translator/caudicle type: d/o

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: E

Pollinia:

length	0.57 mm
widest	0.16 mm

Retinaculum:

length	0.22 mm
shoulder	0.07 mm

almost same width all the way down,
slightly larger at shoulders and hips

Translators:

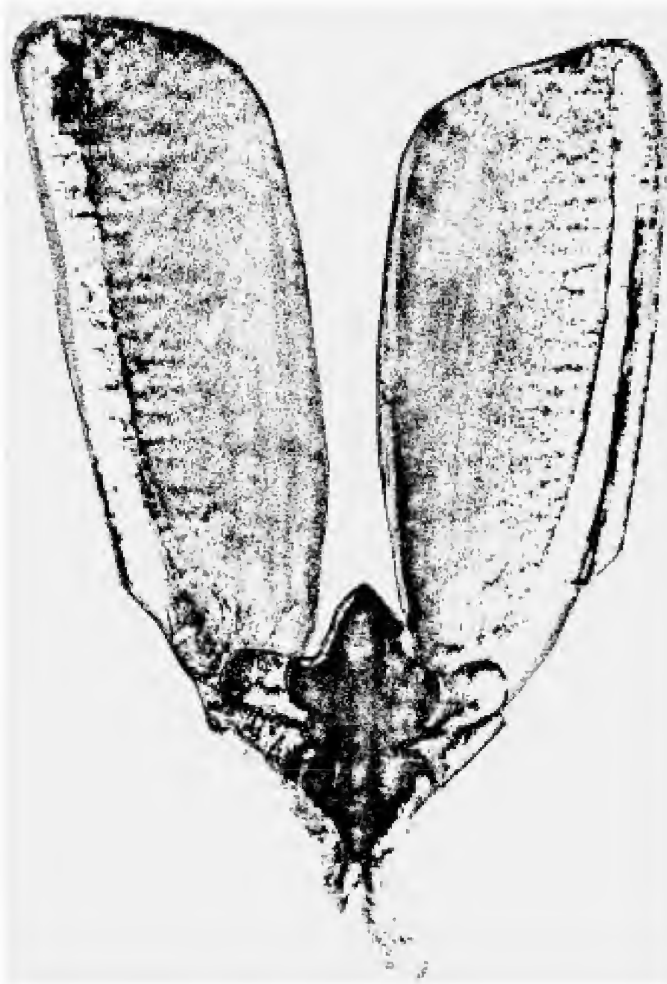
length	0.15 mm
widest	0.08 mm

Caudicles:

bulb diam.	0.07 mm
------------	---------

Hoya sp. DAV 819

Reported to be *Hoya cominsii* (see comparisons above).



Magnified
approximately 165x.

Pollinium

length: 0.56-.58 mm
widest: 0.21 mm

Retinaculum

length: 0.23 mm
shoulder: 0.13 mm
waist: 0.08 mm
hip:* 0.11 mm
ext.: 0.05 mm

Translators

length: 0.08 mm
depth: 0.02 mm

Caudicle

bulb diam.: 0.05 mm

* double hips, lower one
measured.

Translator/caudicle type: d/o

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: S

Hoya erythrina Rintz 1978

Flower from Ann Wayman, Central Point, OR, USA.



The pollinarium enlarged about 165x. This is a fairly large structure. Outer apices are rounded and taper slightly to the inner apex. The pellucid margin is relatively thick and narrows abruptly near the base, this is usually the point where a small orifice is found which supposedly allows nectar to enter and germinates the pollen cells. The translators are deep and broad whereas the clear caudicles are almost hidden. The retinaculum is very long and narrow with a long distance between the shoulders and the hips. The extensions are not well separated and appear rather long.

Pollinia

length	0.57 mm
widest	0.18 mm

Retinaculum

length	0.30 mm including extensions.
shoulders	0.08 mm wide.
waist	0.05 mm wide.
hip	0.09 mm wide.
extensions	0.05 mm

Translators

length	ca. 0.09 mm
widest	0.04 mm at widest portion.

Caudicle

bulb diam.	ca. 0.06 mm
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Translator/caudicle type: d/o

Pollinia apex type: RT

Caudicle bulb: G

Retinacula character: E

Hoya nagtabonensis Kloppenburg Type clone



Pollinarium enlarged about 165x.

Pollinium

length	0.56 mm
widest	0.19 mm

Retinaculum

length	0.22 mm
shoulder	0.08 mm
waist	0.06 mm
hip-1	0.10 mm
hip-2	0.08 mm
ext.	0.02 mm

Translators

length	0.10 mm
depth	0.04 mm
width top	0.02 mm

Caudicle

bulb diam.	0.05 mm
------------	---------

Translator/caudicle type: d/o

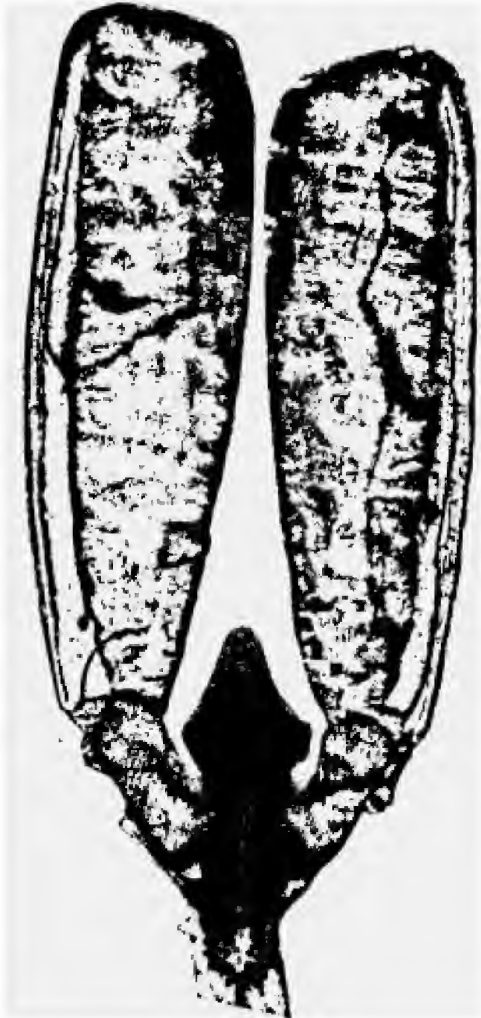
Pollinia apex type: RT

Caudicle bulb: G

Retinacula character: LS

Hoya vitellinia Blume 1849

Flower from clone labeled *H. sp. fuscomarginata*.



Magnified approximately 165x.

Pollinium

length: 0.56 mm
widest: 0.18 mm

Retinaculum

length: 0.24 mm
shoulder: 0.10 mm
waist: 0.06 mm
hip: 0.10 mm
ext.: 0.03 mm

Translators

length: 0.10 mm
depth: 0.05 mm

Caudicle

bulb diam.: 0.06 mm

Translator/caudicle type: d/o

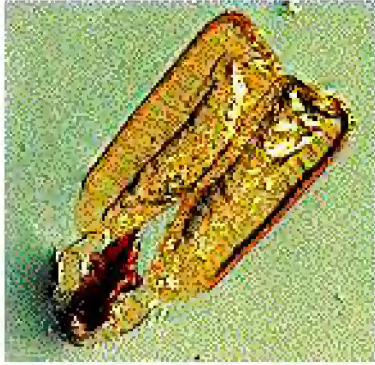
Pollinia apex type: T

Caudicle bulb: G

Retinacula character: HE

Hoya citrina Ridley 1922

Grown and flowered in Fresno, CA. from a clone collected
by Dr. Chin in Central, Malaysia.



Pollinarium enlarged about 65x. Rintz's drawing depicts the leaves of this species exactly as I see them on my clone, however he has drawn the pollinia in good detail (although depicted for me in the wrong configuration) and his pollinia are rounded on the inner end. Note here that the ends are definitely squared off, more so than any other pollinia I am aware of. The translators and caudicles are well developed.

Here the pollinarium is enlarged about 165x. I see one more difference that may



or may not be significant, in relation to Rintz pollinarium and that is the large vacuoles, which do not become more narrow as they proceed to the outer apex. (the attached apex). Note the well developed spatulate shaped translators and the bulbous clear caudicles, sticking to the pollinia.

Pollinium

length	0.56 mm
widest	0.18 mm

Retinaculum

length	0.23 mm
shoulder	0.12 mm
waist	0.08 mm
hip	0.10 mm
extension	0.05 mm

Translators

length	0.13 mm
depth	0.06 mm

Caudicle

bulb diam.	0.08 mm
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Translator/caudicle type: d/o

Pollinia apex type: S

Caudicle bulb: C

Retinacula character: HE

Hoya neobudica Guillaumin 1937

Clone from Esperito Santo, Vanuatu.



Photo of a pollinarium with one pollinium not present enlarged about 165x. The pollinia here are very long, in relative terms and have an unusual inner end, sort of knobbed, and with unusually large vacuoles.

The translators are not well defined but the caudicles with their bulbous ends are readily apparent. The retinacula is well shaped.

Below are two detached pollinia, which show the unusual structure of the inner end. I believe this is structural and not developmental.

One more photomicrograph of a pollinarium enlarged about 165x. In this view the side pockets which as far as I can tell are present in all Retinacula and which actually extend up into near the center of the head area and into which the translators and caudicles extend and are attached. Caudicles and translators in various species appear to be attached along the outside edges of the retinacula at various places but actually extend into these cavities. There is a third cavity on a retinaculum which extends up the center from the lower apex between the two “legs” these cavities do not meet but are separated only by a thin wall.



Translator/caudicle type: d/o

Pollinia apex type: F

Caudicle bulb: G

Retinacula character: HE

Pollinium

length 0.56 mm

widest 0.17 mm

Retinaculum

length 0.16 mm

shoulder 0.12 mm

waist 0.06 mm

hip 0.10 mm

extensions 0.07 mm

Translators

length 0.11 mm

depth 0.03 mm

Caudicle bulb diam.

ca. 0.07 mm

Hoya matavanuensis Kloppenburg 2011
sp. W 9539 cf. diptera

Two views of the pollinaria the top one enlarged about 165x.

Pollinium

length	0.55 mm
widest	0.26 mm

Retinaculum

length	0.26 mm
shoulder	0.15 mm
waist	0.05 mm
hip	0.12 mm
extensions	0.04 mm

Translator

length	0.08 mm
depth	0.03 mm

Caudicle bulb

diameter ca.	0.08 mm
--------------	---------

Caudicle is difficult to discern.



Description of the above herbarium sheet: *Hoya cf. diptera* Seem. 9 May 1944

Translator/caudicle type: d/o

Pollinia apex type: F

Caudicle bulb: G

Retinacula character: S

Hoya deykeae Green 1999 Type clone
Type flower via Ted Green, Kaaawa, HI. USA.



Pollinarium approx. 165x

Note: Sterile pellucid edge does not extend all the way down the outer edge of pollinia, outer ends of pollinia rounded and sloping inward. Translator with lots of round prominent coloration broadening as they extend outward. Clear caudicles extending quite a way up the base of the pollinia. Retinaculum rather long with narrowed hip area and divided outer apex Translators and caudicle seem to be attached below the waste of

Pollinium

length	0.55 mm
widest	0.16 mm

Retinaculum

length	0.32 mm
shoulder	0.09 mm
waist	0.06 mm
hip	0.10 mm
ext.	0.07 mm

Translator

length	0.10 mm
widest	0.05 mm

Caudicle

bulb diam.	0.07 mm
------------	---------

Translator/caudicle type: d/o

Pollinia inner end type: RT

Caudicle bulb: C

Retinacula character: E

Hoya querinoensis Kloppenburg & Mendoza
(unpublished) GM #200



Pollinarium enlarged 160x.

Pollinium

length 0.55 mm
widest 0.19 mm

Retinaculum

length 0.13 mm
shoulder 0.14 mm
waist 0.07 mm
hip 0.12 mm
ext. 0.05 mm

Translator

length 0.12 mm
widest 0.03 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
d/o

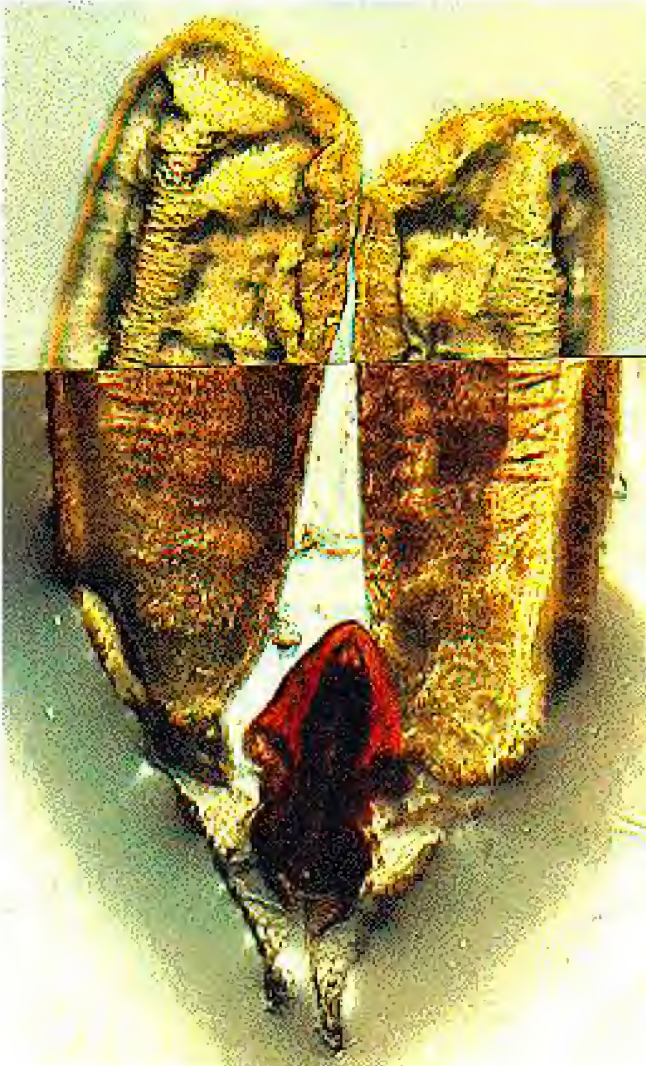
Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Retinacula shoulders are rounded as are the inner pollinia ends.

Hoya shephardii Short ex Hooker 1861



Pollinarium made up of two composite pictures (wouldn't fit in one frame) at 165 magnifications. The translators are relatively long, the retinaculum here is pretty well defined with a long hear portion, fairly broad and long pollinia with well developed vacuoles and pellucid edge.



Another photo of the pollinarium at a lower power, here enlarged about 65x. Note the apparent differences in the retinacula here and above, a difference only of focal length. Here the translators are more readily visible as is the well developed caudicle.

Pollinarium:

Pollinium

length	0.55 mm long.
widest	0.22 mm pellucid edge running down side to opposite the outer end, separated here by a large vacuole.

Retinaculum

length	0.22 mm long to crotch,
shoulders	0.15 mm wide
waist	0.07 mm wide
hips	0.1 mm wide
ext. short ca.	0.05 mm

Central groove well developed as well as the two side holes into the head region.

Translators

length	0.11 mm long, near retinacula
wide	0.11 mm at its base

Caudicle

bulb diam.	0.11 mm
------------	---------

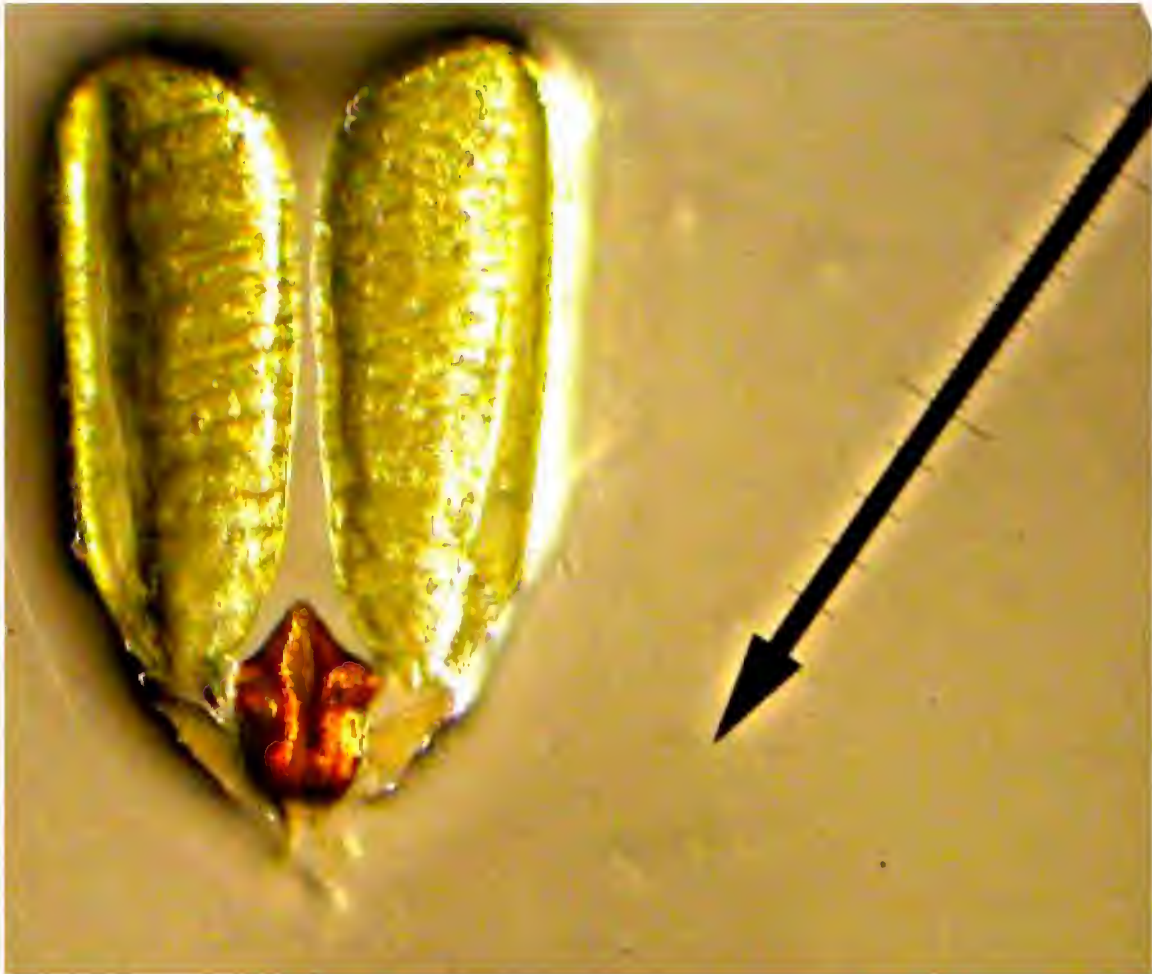
Translator/caudicle type: d/o

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: S

Hoya purificacioniae Kloppenburg & Siar
Sent via Monina Siar 19 March 2010, 5 flowers in small zip bag.
Plant lost



Pollinarium enlarged about 165X. Ratio: pol./width 2.3 pol./ret. 2.5

Pollinium

length	0.54 mm
widest	0.23 mm

Caudicle

Bulb diam.	0.09 mm
------------	---------

Bulb: C

Retinaculum

length	0.17 mm
shoulder	0.14 mm
waist	0.10 mm
hip	0.11 mm
ext.	0.05 mm

Translator/caudicle type: d/o

Retinacula character: S

Translators

length	0.10 mm
depth	0.04 mm

Pollinia apex type: T

Hoya sp. USDA 354241
Grown and flowered at Fresno, CA.



Magnified about
165x

Pollinium

length: 0.54 mm
widest: 0.18 mm

Retinaculum

length 0.21 mm
shoulder 0.11 mm
waist 0.06 mm
hip 0.08 mm
ext. 0.07 mm

Translators

length: 0.16 mm
depth: 0.06 mm

Caudicle

bulb. diam.: 0.07
mm

Translator/caudicle type: d/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: HE

Hoya surigaoensis Kloppenburg, Simeona V. Siar & Torill Nyhuus
2010



The photo above is enlarged about 165x. The translator type on the pollinarium I have designated as perpendicular. Other hoya species with this type translator are; *mitrata*, *darwinii*, *leucorhoda*, *rigida*, *longifolia* and others. Ratios: ret/pol.= 4.8; pol. l/w =3.7

Pollinium

length 0.53 mm

widest 0.14 mm

Retinaculum

length 0.11 mm

shoulder 0.06 mm

waist 0.03 mm

hips 0.05 mm

ext. 0.05 mm

Translator

length 0.07 mm

Caudicle

bulb diam. 0.03 mm

Type: G

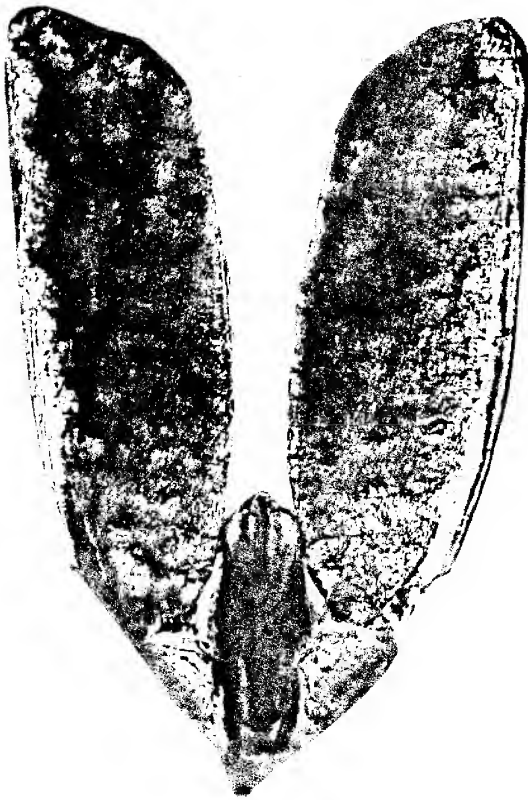
Translator/caudicle type: d/o

Pollinia end type: R

Retinacula character: S

***Hoya cardiophylla* Merrill 1920**

Flower from clone 910302 via DH, flowered in Fresno, CA.



Pollinium

length: 0.52 mm
widest: 0.18 mm

Retinaculum

length: 0.20 mm
shoulder: 0.07 mm
waist: 0.06 mm
hip: 0.09 mm
ext.: 0.02 mm

Translators

length: 0.11 mm
depth: 0.05 mm

Caudicle

bulb. diam.: 0.08 mm

Magnified approximately 165x.

Type: C

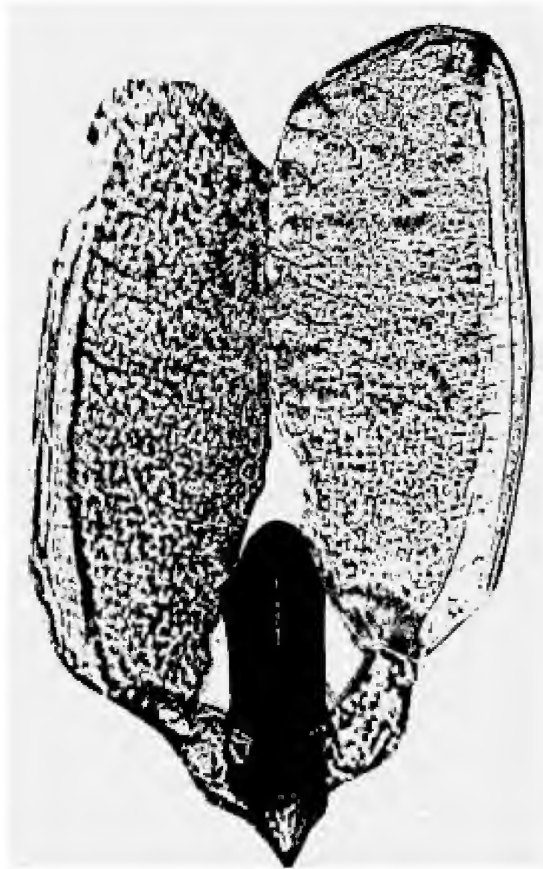
Translator/caudicle type: d/o

Pollinia end type: T

Retinacula character: E

Hoya sp. Here (UC) 1013 Colon

Labeled *H. quinquinervia*.



Magnified approximately 165x.

Pollinium

length: 0.52 mm
widest: 0.22 mm

Retinaculum

length: 0.24 mm
shoulder: 0.09 mm
waist: 0.07 mm
hip: 0.09 mm
ext.: 0.04 mm

Translators

length: 0.12 mm
depth: 0.04 mm

Caudicle

bulb. diam.: 0.08 mm
Double hip (upper) 0.10 mm

Translator/caudicle type: d/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: E

Note: I believe this clone is *Hoya cardiophylla* Merrill based on a comparison of the pollinaria.

Hoya benvergarai Klopp. & Siar 2008

Type clone Flowers from Monina Siar

Roll 331 10/24/05



Pollinarium enlarged about 165x.

Pollinium: with rounded inner apices, pellucid edge extends to base but not around end.

length	0.52 mm
widest	0.21 mm

Retinaculum: skewed a little so difficult to obtain precise measurements.

length	0.13 mm
shoulder	0.16 mm
waist	0.08 mm
hip	0.10 mm
ext.	0.04 mm

Translators: from waist area

length	0.10 mm
widest	0.05 mm

Caudicle:

bulb diameter	0.05 mm
---------------	---------

Type: C

Translator/caudicle type: d/o

Pollinia apex type: R

Retinacula character: S

Hoya graveolens Kerr 1939

Collected in Thailand, by Ted Green.



Pollinarium enlarged about 165x. The Retinaculum has a rounder head and there is a rounder flare well down on the sides just above the waist with more broadly rounded hip area. Caudicles are relatively small.

Pollinia

length	0.52 mm
widest	0.19 mm

Retinaculum

length	0.21 mm
shoulder	0.06 mm
2 nd bulge	0.08 mm
waist	0.04 mm
hip	0.06 mm
ext.	0.05 mm

Translator

length	0.07 mm
depth	0.04 mm

Caudicle

bulb diam.	0.05 mm
------------	---------

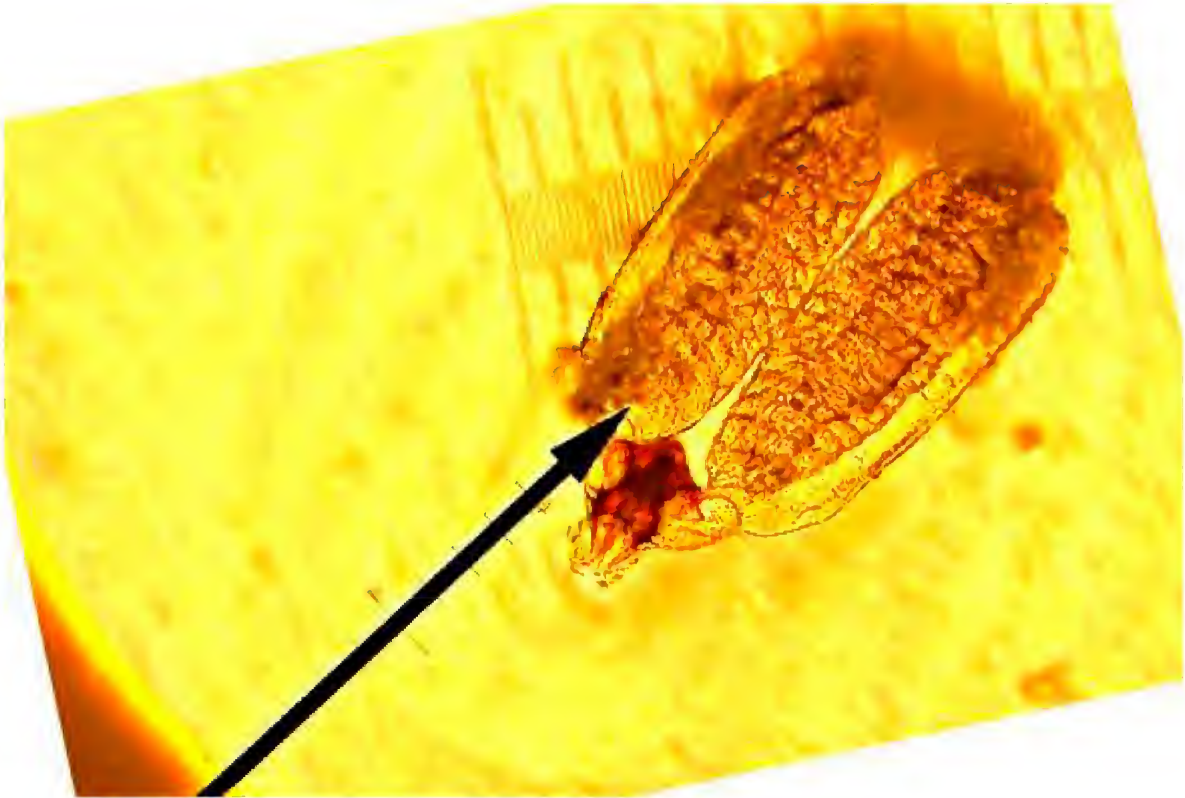
Translator/caudicle type: d/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: E

Hoya isabelaensis Kloppenburg, Siar & Ferreras 2011



Pollinarium enlarged about 180x

Pollinium

length	0.51 mm
widest	0.20 mm

Translator

length	0.12 mm
depth	0.02 mm

Retinaculum

length	0.12 mm
shoulder	0.12 mm
waist	0.05 mm
hip	0.09 mm
ext.	0.06 mm

Caudicle

bulb diam.	0.05 mm
------------	---------

Type: G

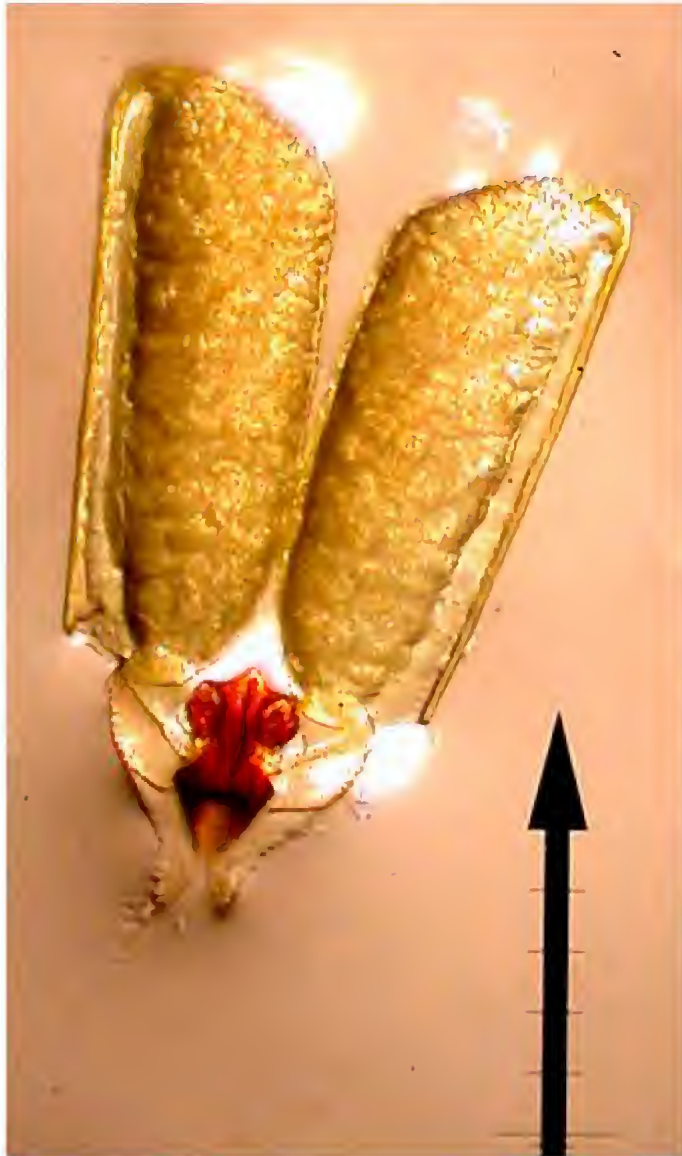
Ratios: pol./width	2.6
pol./ret.	4.3

Translator/caudicle type: d/o

Pollinia apex type: R

Retinacula character: S

Hoya soligamiana Kloppenburg & Siar 2009



A pollinarium greatly enlarged. Inner apex broadly rounder, tapering centrally, pellucid edge extends over the inner apex and ends inwardly in a broad end. Everything about this pollinarium is beautiful, clear, sharp and well defined.

Pollinium:

length	0.51 mm
widest	0.18 mm

Retinaculum:

length	0.11 mm
shoulders	0.09 mm
waist	0.05 mm
hip	0.09 mm
ext.	0.05 mm

Translators:

length	0.09 mm
deepest	0.04 mm.

Caudicle

bulb diam.	0.07 mm
------------	---------

Type: C

Ratio: poll/ret. 4.6
Pol/width 2.8

Translator/caudicle type: d/o

Pollinia apex type: T

Retinacula character: S

Arrow head in 0.10 mm. long, head width is 0.05 mm wide, same between marks on shaft. Below scale in background is 0.10 mm between longest marks.

Hoya lambii Green 2000
From **Holotype** material #9905 (BISH)



Pollinarium enlarged about 165x.

Pollinia

length	0.51 mm
widest	0.21 mm

Retinaculum

length	0.17 mm
shoulder	0.22 mm
waist	0.05 mm
hip	0.08 mm
extensions	0.10 mm

Translator

length	0.07 mm round
--------	---------------

Caudicle

bulb diam.	0.06 mm
------------	---------

Translator/caudicle type: d/o

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: S

Hoya xxxxxxxx Kloppenburg & M. V. Siar sp. nov.

Flowered in Fresno, CA. clone from Cebu Is., Philippines via
Professor Juan Pancho.

Photomicrograph of Pollinarium enlarged approx. 165x.

This picture shows vividly that seldom are the two pollinia of the same size. This species has a very distinctive retinaculum with well defined features, a large grooved



head also centrally grooved. The translators are large and well defined supporting very small and hardly visible clear caudicles. Both structures (caudicles and translators) seem to be attached well down on the retinaculum. This is a good photo showing all features of a pollinarium.

Pollinium

length: 0.51 mm

widest: 0.18 mm

Retinaculum

length: 0.22 mm

shoulder: 0.11 mm

waist: 0.08 mm

hip: 0.11 mm

ext.: 0.04 mm

Translators

length: 0.12 mm

depth: 0.06 mm

Caudicle

bulb diam.: 0.04 mm

Translator/caudicle type: d/o

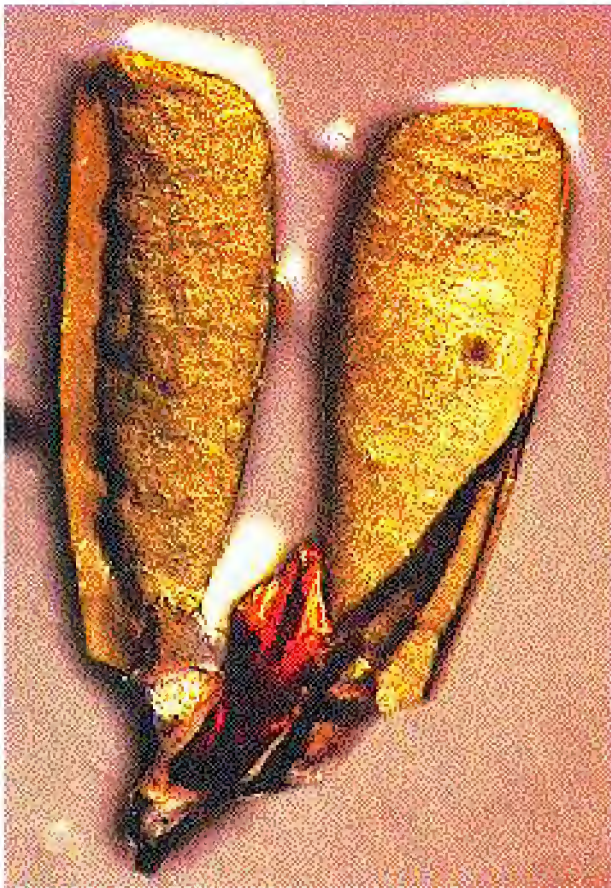
Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: S

Hoya pentaphlebia Merrill 1918

Flower from clone blooming at Fresno, CA. USA.



Pollinarium enlarged approx. 165x. The distinctive feature is the broadly rounded inner lobe of the pollinium, along with a well A A well defined Retinaculum. Translators and caudicles seem to be attached well down on the waist of the retinaculum. The pellucid edge extends well down toward the inner pollinia apex.

Pollinium

length: 0.51 mm
widest: 0.18 mm

Retinaculum

length: 0.23 mm
shoulder: 0.09 mm
waist: 0.06 mm
hip: 0.09 mm
ext.: 0.02 mm

Translators

length: 0.09 mm
depth: 0.03 mm

Caudicle

bulb diam.: 0.05 mm

Translator/caudicle type: d/o

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: S

Hoya cagayanensis Burton 1987

White flowered clone from Monina Siar, Mt. Banahao.



Pollinarium:

Pollinium

length	0.51 mm
widest	0.24 mm

Retinaculum

length	0.25 mm
legs	0.09 mm
head	0.28 mm

Translators

length	0.13 mm
widest	0.05 mm

Caudicle

bulb diam.	0.06 mm
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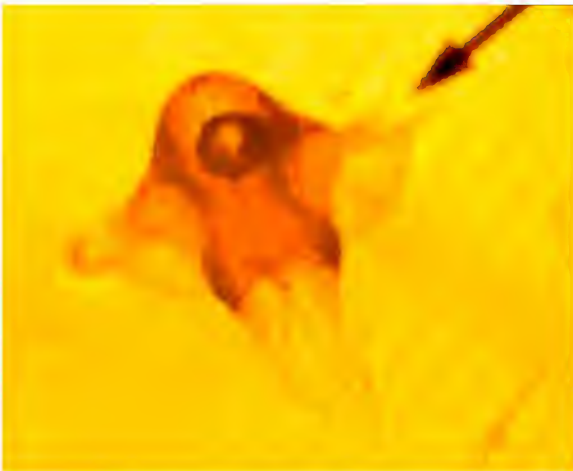
Translator/caudicle type: d/o

Pollinia inner end type: T

Caudicle bulb: ?

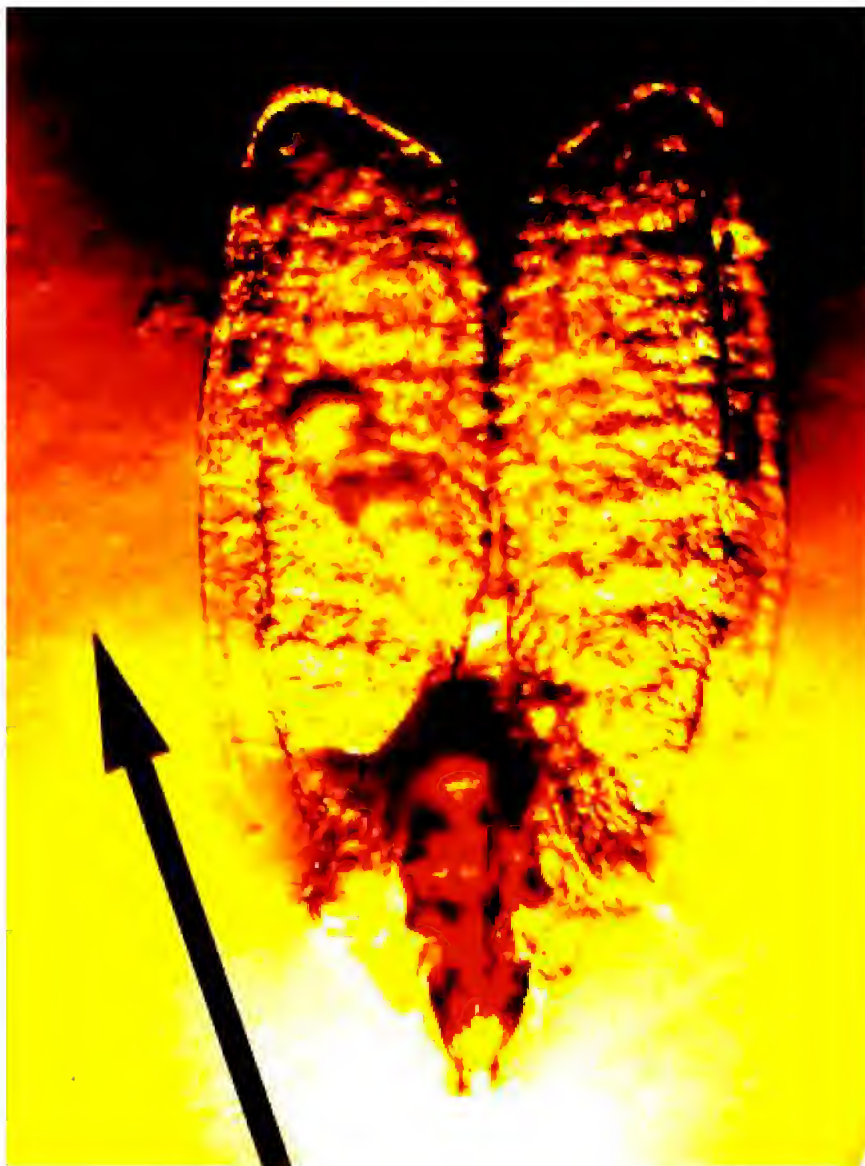
Retinacula character: LN

This pollinarium type is found in Philippine hoya species like *bordenii*, *pimenteliana* & *cagayanensis*.



A more detailed picture of the retinaculum with its head, waste and hips more visible. The extensions (legs) are not well defined as is the body but nevertheless relatively long.

Hoya butleriana Kloppenburg, Siar, Guevarra & Carandang 2013
Hoya sp. Purificacion #3 **Type** clone



Pollinarium
 enlarged about
 165x.

Pollinium

length	0.51 mm
widest	0.22 mm

Translator

length	0.11 mm
widest	0.05 mm

Retinaculum

length	0.29 mm
shoulder	0.14 mm
waist	0.06 mm
hip	0.08 mm
ext	0.02 mm

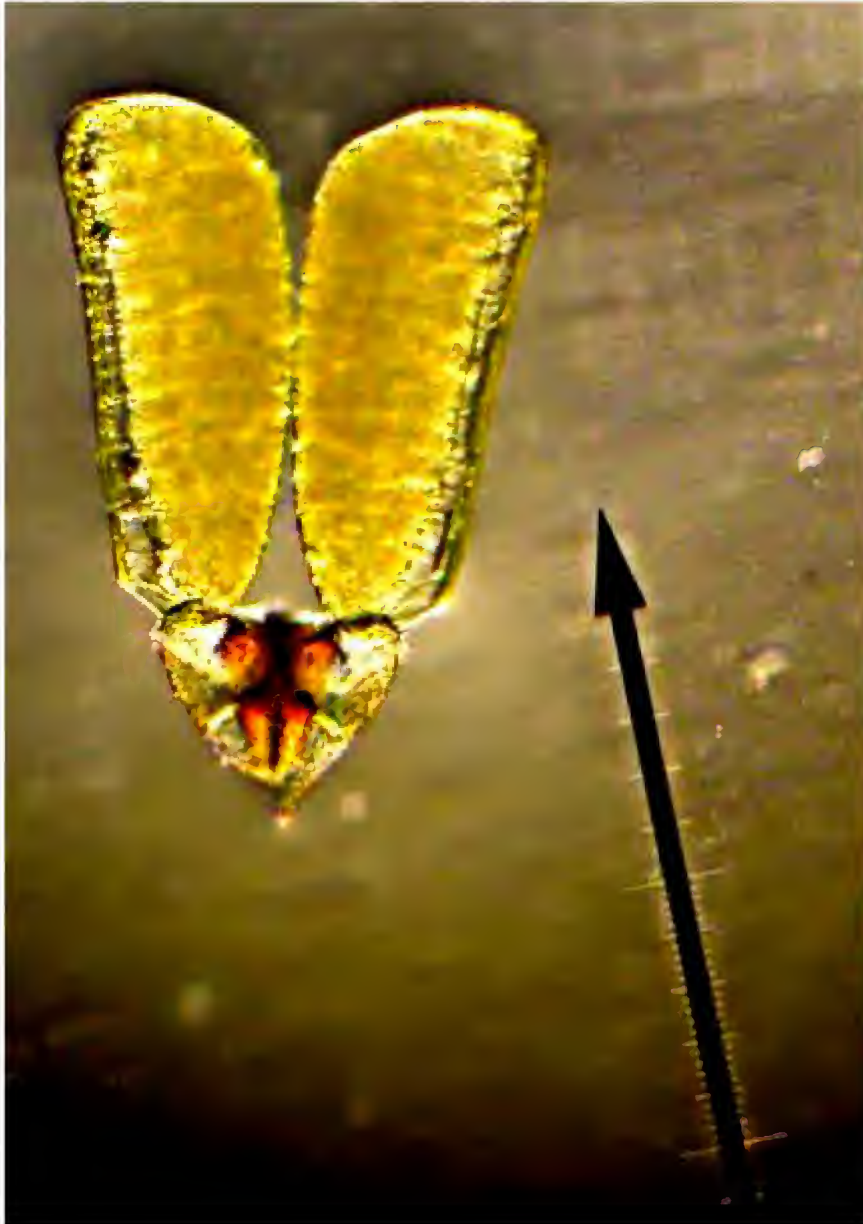
Caudicle

bulb diam.	0.04 mm
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Translator/caudicle type: d/o
Pollinia inner end type: T

Retinacula character: LS
Caudicle bulb: C ?

Hoya aurigueana subsp. altocolora Kloppenburg & Mendoza
(unpublished) GM #30



Pollinarium
enlarged ca. 140x.

Pollinium

length 0.50 mm
widest 0.20 mm

Retinaculum

length 0.06 mm
shoulder 0.12 mm
hip 0.04 mm
waist 0.08 mm
ext. 0.08 mm

Translators

length 0.13 mm
depth 0.04 mm
unusual shape

Caudicle

bulb diam. 0.06
mm

Translator/caudicle type: d/o or p/o difficult to classify.

Pollinia end type: R

Caudicle bulb: G ?

Retinacula character: S

Hoya elsae Kloppenburg & Mendoza



Pollinium enlarged ca.
125x.

Pollinium

length 0.50 mm
widest 0.17 mm

Retinaculum

length 0.15 mm
shoulder 0.15 mm
waist 0.05 mm
hip 0.08 mm
ext, 0.04 mm

Translator

length 0.10 mm
widest 0.04 mm

Caudicle

bulb diam. 0.04 mm

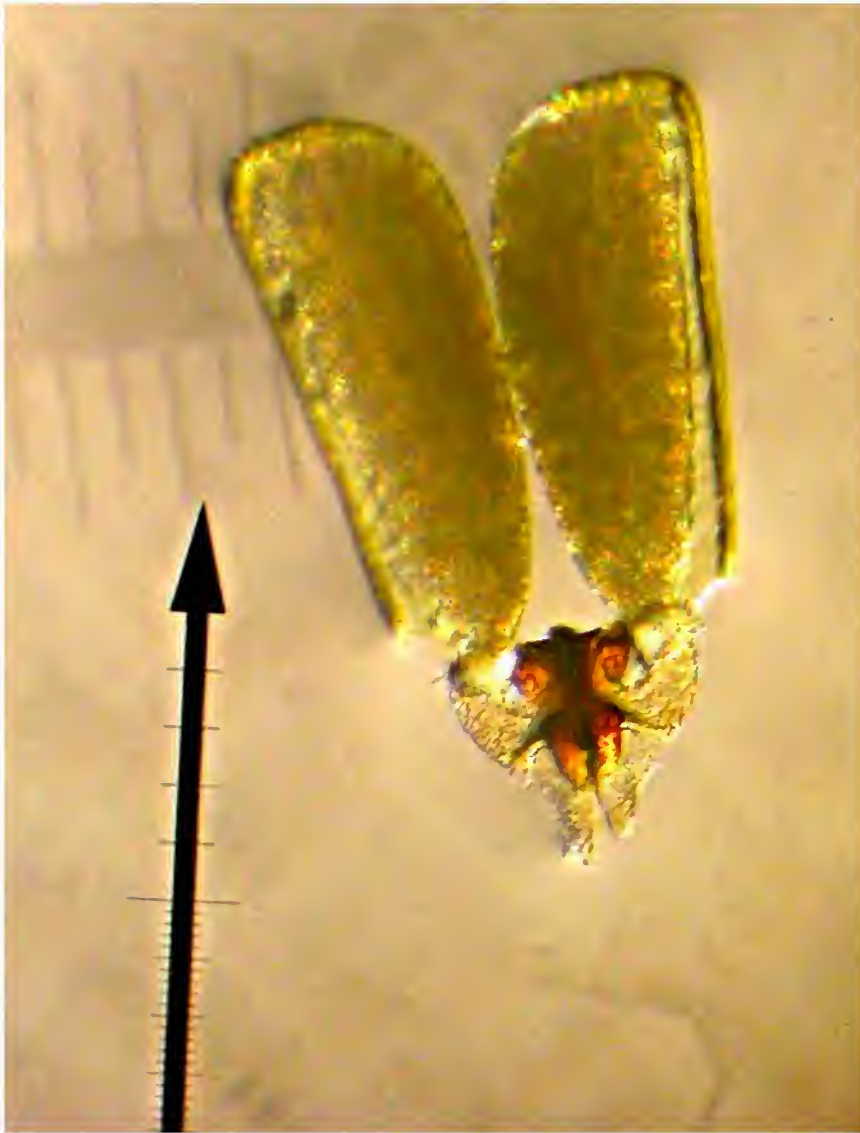
Translator/caudicle type: d/o **Retinacula type:** S (shield) **Pollinia inner end type:** R (round).

Hoya marsianii Kloppenburg & Mendoza
(unpublished) GM #29



Two Pollinarium greatly enlarged, measurements on photo below.

The arrow head is 0.01 mm long and its base 0.005 mm wide. The pellucid edge extends a little way over the pollinia inner edge and nearly even with its attachment end. Caudicle ends to which the pollinia are stuck are round “o” shaped.



Pollinarium
enlarged ca. 100x:

Pollinium:

length 0.50 mm
widest 0.19 mm

Retinaculum:

length 0.11 mm
shoulder 0.14 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.05 mm

Translator:

length 0.10 mm
widest 0.05 mm

Caudicle:

bulb diam. 0.06 mm

Note: the translator and caudicle inner ends are attached to the outer wall of the retinaculum at the shoulder.

Translator/caudicle type: d/o

Pollinia end type: R

Caudicle bulb: G ?

Retinacula character: S

**Photomicrographs from clone 910301 collected by Blass
Hernaez to me via Dexter Heuschkel**



Pollinarium enlarged about 82x.

Pollinia

length	0.48 mm
widest	0.16 mm

Retinaculum

length	0.18 mm excluding extensions
shoulders	0.08 mm
waist	0.04 mm
hips	0.05 mm
extensions	0.04 mm

Translators

length	0.09 mm very wide and extending well below attachment point.
widest	0.01 mm ca
depth	0.04 mm ca.

Caudicle bulb 0.05 mm in diameter.

Clear

Translator/caudicle: d/o

Pollinia inner ends: T

Retinacula: LS

Hoya cf. fitchii vial #20



Pollinarium
enlarged ca. 170x.

Pollinium

length	0.48 mm
widest	0.19 mm

Retinaculum

length	0.14 mm
shoulder	0.14 mm
waist	0.08 mm
hip	0.10 mm
ext.	0.06 mm

Translator

length	0.14 mm
depth	0.03 mm

Caudicle

bulb	0.07 mm
------	---------

Type: G

Translator/Caudicle Type: d/o

Pollinia inner end type: R

Retinacula character: S

Hoya blashernaezii ssp. valmayoriana Kloppenburg, Guevarra, &
 Carandang
 ISSN 1655-3179 Type clone.



Pollinium enlarged ca. 200x.

Pollinium

length	0.48 mm
widest	0.23 mm

Translator

length	0.10 mm
depth	0.05 mm

Retinaculum

length	0.10 mm
shoulder	0.15 mm
waist	0.07 mm
hip	0.08 mm
ext.	0.04 mm

Caudicle

bulb diam.	0.04 mm
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Retinacula character: S

Translator type: d/o

Pollinia inner end type: R

Caudicle bulb: C

Hoya crassicaulis Elmer ex Kloppenburg 1995

Flower from **Type** specimen Elmer #14440

Mt Bulusan, Sorsogon, Luzon, Philippines.



	<u>top subject</u>	<u>bottom subject</u>
Pollinium		
length:	0.48 mm	0.43 mm
widest:	0.18 mm	0.16 mm
Retinaculum		
length:	0.21 m	0.18 mm
shoulder:	0.09 mm	0.10 mm
waist:	0.06 mm	0.06 mm
hip:	0.08 mm	0.10 mm
ext.:	?	?
Translators		
length:	?	?
depth:	?	?
Caudicle		
bulb diam.:	?	?

Magnified approximately 165x.

Magnified approximately 165x.

Note: This grouping points out one of the difficulties with working with herbarium material. This material was soaked in 'Kew Solution' to make it more pliable to manipulation. In spite of this the retinaculum tended to remain curved and thus difficult to get precise measurements. Overall the relationships of relative size and shape of parts can be recognized.



Translator/caudicle type: d/o

Pollinia inner end type: R

Caudicle bulb: ?

Retinacula character: S

CAHUP #5297

Determined to be very close to 900307 (*H. merrillii*)



7

Pollinarium enlarged about 165x.

Pollinium

length	0.47 mm.
widest	0.20 mm.

Retinaculum

length	0.12 mm.
shoulder	0.11 mm.
waist	0.06 mm.
hip	0.08 mm.
ext.	0.06 mm.

Translators

length	0.12 mm
depth	0.01 mm.

Caudicle

bulb diam.	0.08 mm.
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Ret. Pol ratio 1:4.3

Translator/caudicle type: d/o

Pollinia inner end type: RT

Caudicle bulb: C

Retinacula character: S

Sheet labeled *Hoya macgregorii* Schlechter but it is not that species. Outer lobes of corona on that species are not "breviter excises" briefly excised. Most closely resembles sp. 900307 that I believe is *Hoya merrillii* Schlechter.

Hoya palawanensis subsp. majora Kloppenburg, Siar, Mendoza,
Guevarra & Carandang 2012



Pollinarium enlarged about 150x.

Pollinium

length	0.47 mm
widest	0.19 mm

Retinaculum

length	0.10 mm
shoulder	0.12 mm
waist	0.05 mm
hip	0.08 mm
ext.	0.04 mm

Translator

length	0.12 mm
depth	0.06 mm

Caudicle

bulb diam.	0.07 mm
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Type: Clear

Translator Type: d/o

Pollinia inner end type: R

Hoya makatongensis Kloppenburg & Mendoza
(unpublished) GM #152



Pollinarium enlarged 140x.

Pollinium

length	0.47 mm
widest	0.18 mm

Retinaculum

length	0.14 mm
shoulder	0.15 mm
waist	0.10 mm
hip	0.10 mm
ext.	0.03 mm

Translator

length	0.10 mm
wide	0.03 mm

Caudicle

bulb diam.	0.06 mm
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Translator/caudicle type:

ls/o might be d/o

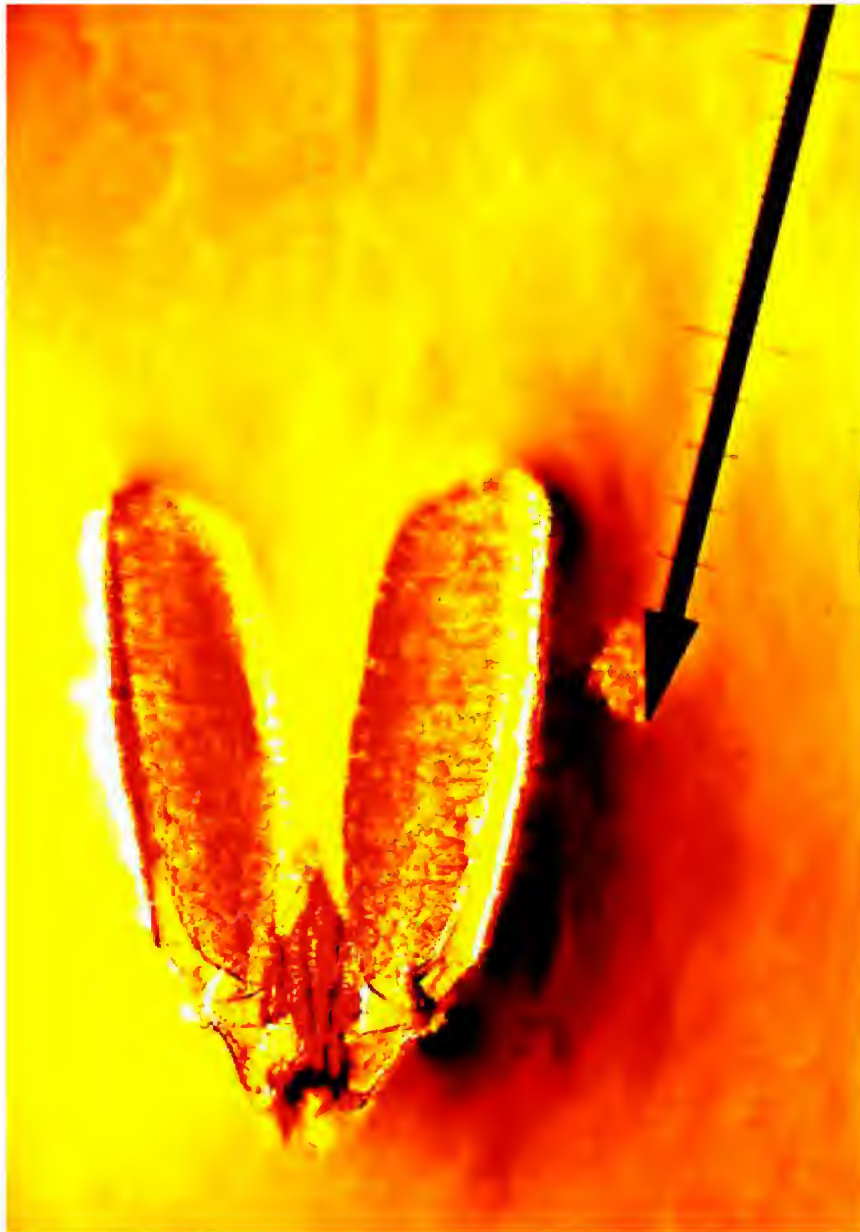
Pollinia apex type: RT

Caudicle bulb: C

Retinacula character: S

Hoya marlowei subsp. infantaensis Kloppenburg & Mendoza
(unpublished) GM #8

Pollinarium enlarged ca. 140x.



Pollinium

length 0.47 mm
widest 0.16 mm

Retinaculum

length 0.20 mm
shoulder 0.08 mm
waist 0.04 mm
hip 0.07 mm
ext. 0.06 mm

Translator

length 0.16 mm
depth 0.05 mm

Caudicle

bulb 0.08 mm

Translator/caudicle type: d/o

Ratios: p/w 2.9 p/r 2.4

Pollinia end type: RT

Retinacula character: LS

Caudicle bulb: C

Hoya benvergarae Kloppenburg & Siar 2008

Pollinarium enlarged about 165x.



Pollinium: with rounded inner apices, pellucid edge extends to base but not around end.

length 0.47 mm
widest 0.21 mm

Retinaculum:

length 0.13 mm
shoulder 0.10 mm
waist 0.06 mm
hip 0.07 mm
ext. 0.04 mm

Translators:

length 0.10 mm
depth 0.05 mm

Caudicle:

bulb diameter 0.05 mm

Type: C

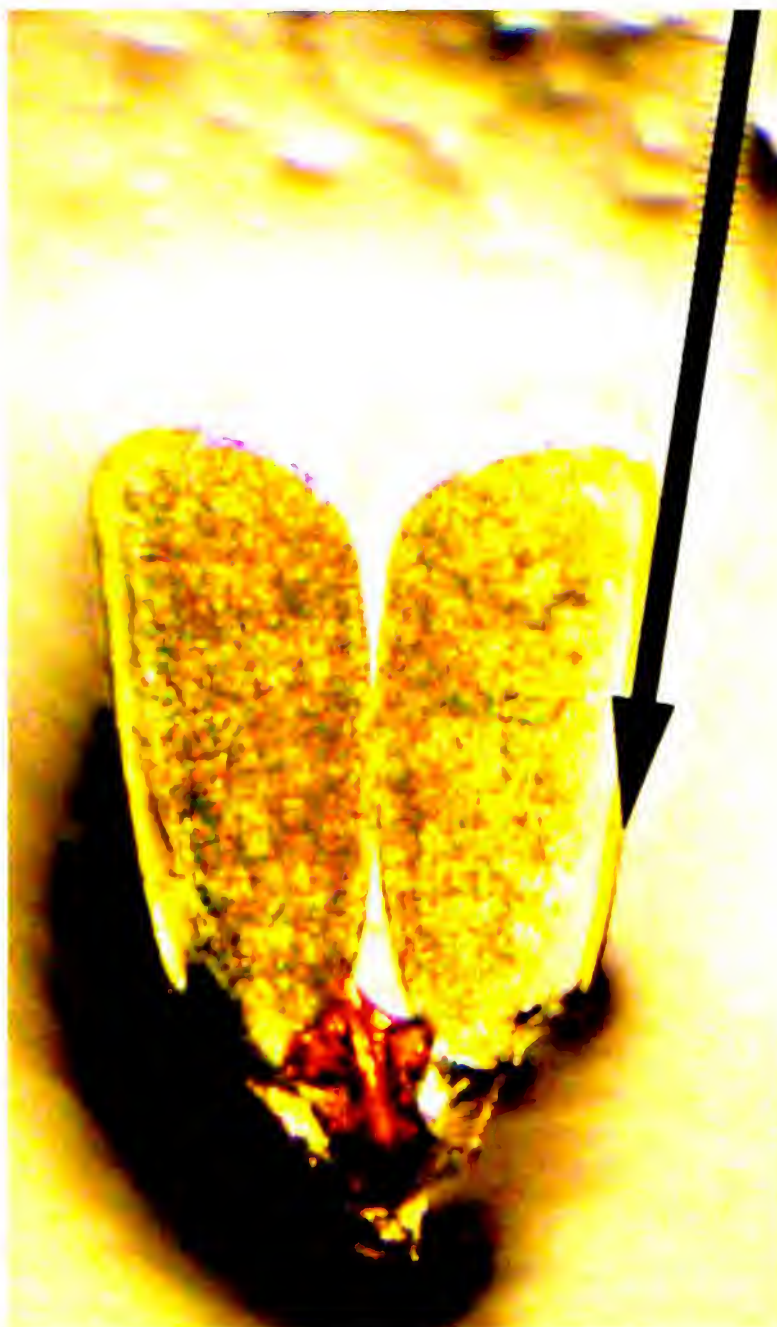
Ratio: r/p 2.6; p/w 2.1

Translator/caudicle type: d/o

Pollinia apex type: T

Retinacula character: S

Hoya benvergarai subsp. gelba Kloppenburg & Mendoza
(unpublished) GM #78



Pollinarium enlarged ca.
151x

Pollinium

length 0.47 mm
widest 0.20 mm

Retinaculum

length 0.19 mm
shoulder 0.12 mm
waist 0.08 mm
hip 0.09 mm
ext 0.03 mm

Translator

length 0.10 mm
wide 0.03 mm

Caudicle

bulb diam. 0.05 mm

Type: C

Translator/caudicle type:
d/o

Pollinia inner end type: T

Caudicle bulb: C

Retinacula character: S

Hoya linapauliana Kloppenburg, Siar & Mendoza,
(unpublished) # Q5-188



Pollinarium enlarged ca.
160x.

Pollinium

length 0.47 mm
widest 0.20 mm

Retinaculum

length 0.15 mm
shoulder 0.14 mm
waist 0.07 mm
hip 0.10 mm
ext. 0.05 mm

Translator type:

length 0.10 mm
depth 0.04 mm

Caudicle

bulb diam. 0.02 mm

Ratios: p/r 3.1
p/w 2.4

Translator/caudicle type:
d/o

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: S

Hoya linapauliana subsp. verida Kloppenburg, Siar, Cajano
(unpublished) #Q5-162



Pollinarium enlarged
160x.

Pollinium

length 0.47 mm
widest 0.20 mm

Retinaculum

length 0.13 mm
shoulder 0.14 mm
waist 0.05 mm
hip 0.08 mm
ext. 0.07 mm

Translator

length 0.10 mm
depth 0.03 mm

Caudicle

bulb diam. 0.04 mm

Type: C

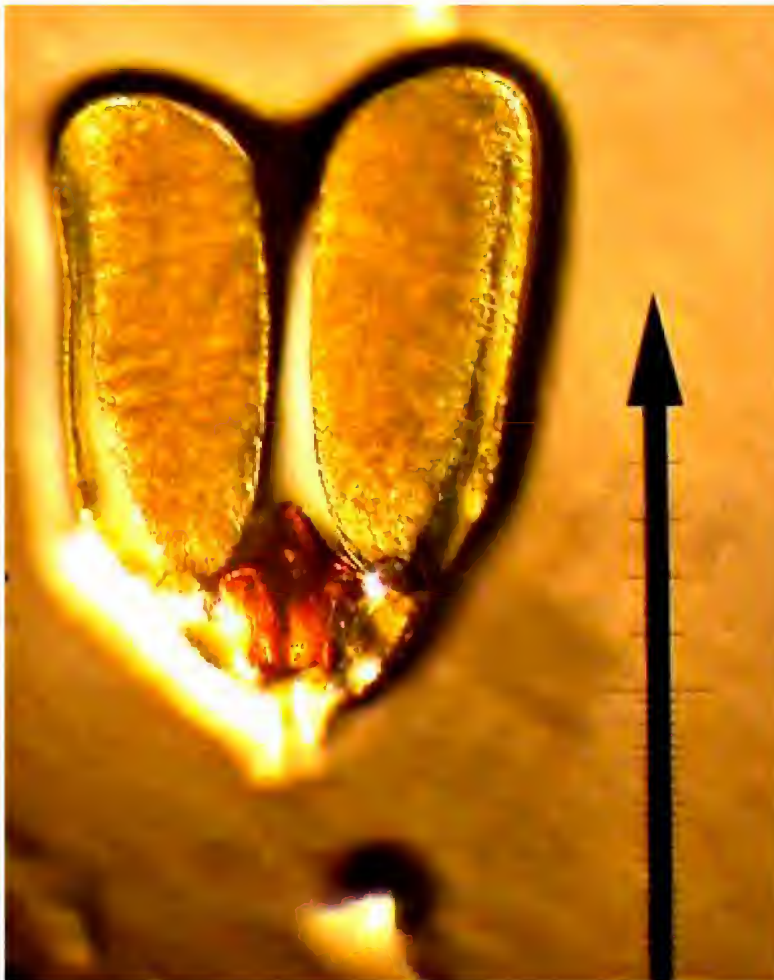
Ratios: p/r 4.7 p/w 2.4

Translator/caudicle type: d/o

Pollinia inner end type: T

Retinacula character: S

Hoya linapauliana subsp. nakarensis Kloppenburg & Mendoza
(unpublished) GM #87



Pollinarium enlarged ca.

Pollinium

length 0.47 mm
widest 0.20 mm

Retinaculum

length 0.15 mm
shoulder 0.15 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.05 mm

Translator

length 0.10 mm
wide 0.05 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle

Type: d/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: S

Hoya palawanensis Kloppenburg, Siar & Mendoza 2015



Pollinarium enlarged about 150x.

Pollinium

length	0.47 mm
widest	0.19 mm

Retinaculum

length	0.10 mm
shoulder	0.12 mm
waist	0.05 mm
hip	0.08 mm
ext.	0.04 mm

Translator

length	0.12 mm
depth	0.06 mm

Caudicle

bulb diam.	0.07 mm
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Translator Type: d/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: HU

Hoya palawanensis subsp. minora Kloppenburg 2015



Pollinarium enlarged about 155x.

Pollinium

length	0.47 mm
widest	0.20 mm

Retinaculum

length	0.12 mm
shoulder	0.11 mm
waist	0.06 mm
hip	0.08 mm
ext.	0.06 mm

Translators

length	0.12 mm
depth	0.01 mm

Caudicle

bulb diam.	0.08 mm
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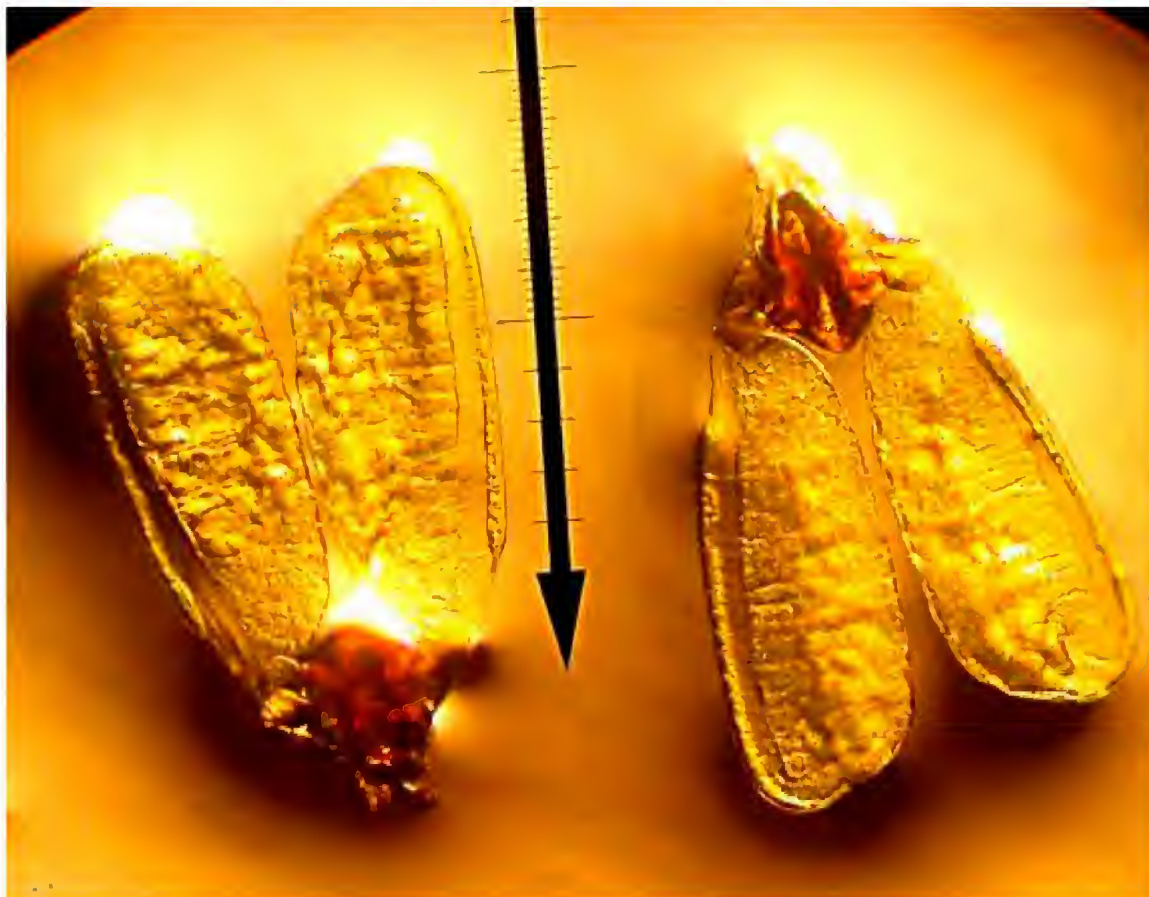
Ret/Pol ratio 1:4.3

Translator/caudicle type: d/o

Pollinia inner end type: RT

Retinacula type: S

Hoya sp. 2012-4-029
 13 May 20122012-4-29 H. fitchii?



Pollinaria above:

Pollinium

length	0.47 mm
widest	0.18 mm

Retinaculum

length	0.17 mm
shoulder	0.12 mm
waist	0.10 mm
hip	0.09 mm
ext.	0.05 mm

Translator

length	0.10 mm
width	0.03 mm

Caudicle

bulb diam.	0.06 mm	clear
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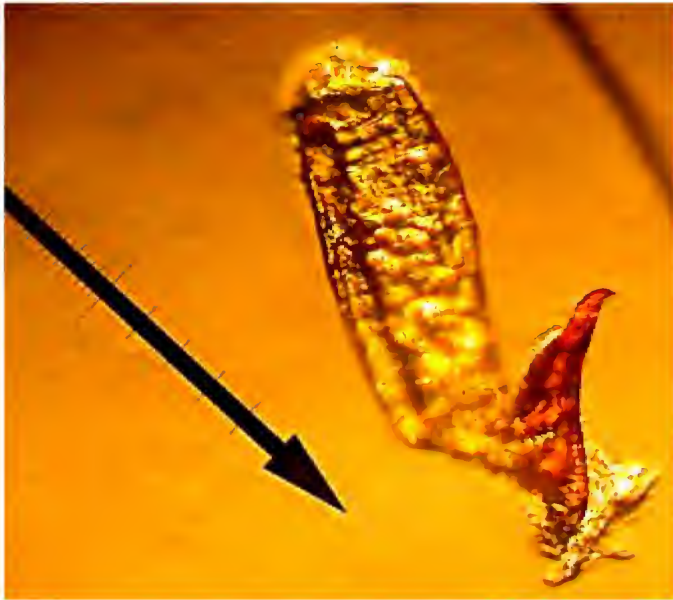
Caudicle bulb: C

Translator type: d/o

Pollinia inner end type: R

Retinacula character: S

Hoya marvinii Kloppenburg & Mendoza
(unpublished) GM #50



Pollinaria 2 photos enlarged ca. 130x. This was extremely difficult to work with. The retinacula are very narrow and turned sideways easily.

Pollinium

length	0.47 mm
widest	0.17 mm

Retinaculum

length	0.12 mm
widest	0.06 cm
extensions	0.05 mm

Translators

length	ca. 0.06 mm	but difficult to determine
widest	ca. 0.03 mm	

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type: ls/o ?

Pollinia end type: R

Caudicle bulb: G ? **Retinacula character:** E



Photomicrographs **from #900355** via Dexter Heuschkel Philippines. Fresno, California bloom 8/4/91 3 clusters 1st blooming 34 flowers with center forming new buds, flowers creamy yellow with bronze reflexed lobes, corona white and horizontal dorsal, outer apex turns up slightly.



Pollinaria enlarged about 165x.

Pollinia		
length		0.47 cm
widest		0.16 cm
Retinaculum		
length		0.19 cm
shoulder		0.09 cm
waist		0.05 cm
hip		0.07 cm
ext.		0.06 cm
Translators		
length		0.09 cm
deepest		0.05 cm

Caudicle bulb diam. 0.05 cm

Translator/caudicle type: d/o

Pollinia end type: T

Caudicle bulb: G ?

Retinacula character: AS

Hoya cajanoae Kloppenburg
(unpublished) pink



Pollinarium
enlarged 135x.

Pollinium

length 0.46 mm
widest 0.20 mm

Retinaculum

length 0.21 mm
shoulder 0.11 mm
waist 0.07 mm
hip 0.08 mm
ext. 0.05 mm

Translator

length 0.07 mm
wide 0.06 mm

Caudicle

bulb 0.06 mm

Translator/caudicle type:
d/o

The retinaculum head is rounded, shoulder area of the retinaculum is 0.08 cm long, Translator inner ends appear to be attached to the outer surface of the retinacular inner channel. Pollen grains are well defined and large. Pellucid edge ends well above the pollinia lower apex.

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: LS

Hoya aurigueana Kloppenburg, Siar & Cajano 2013

ISSN #1655-3179 **Type** clone



Pollinarium
enlarged, photo by
Jorge R. Sahagun,
Fernando Arugiue's
assistant.

Pollinia

length 0.46 mm
widest 0.20 mm

Retinaculum

length 0.11 mm
shoulder 0.10 mm
hip 0.08 mm
waist 0.09 mm
ext. 0.03 mm

Translators

length 0.18 mm

Caudicle bulb
diam. 0.06 mm

Type: G

Translator Type: d/o

Pollinia inner end type: T

Caudicle bulb: G

Retinacula character: S

Hoya lagunaensis Kloppenburg 2015
sp. CAHUP 5965



Pollinarium enlarged about 165x.

Pollinium

length 0.46 mm
widest 0.18 mm

Retinaculum

length 0.14 mm
shoulder 0.10 mm
waist 0.05 mm
hip 0.08 mm
ext 0.06 mm

Translator

length 0.08 mm
depth 0.03 mm

Caudicle

bulb diam. 0.05mm



Ratio Ret.- Poll.: 1:3.3

Translator Type: d/o

Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: S

Hoya cagayanensis Burton 1987
from #45730 (UC)
 Casiguran, Tayabas Prov., Luzon, Philippines,
 20 June 1925.



Pollinarium enlarged ca. 165x.
 Just as Dr. Schlechter drew it on his
 herbarium sheet.

Pollinarium

length	0.46 mm
widest	0.26 mm

Retinaculum

length	0.39 mm
shoulder	0.27 mm
waist	0.11 mm
hip	0.12 mm
ext.	0.07 mm

Translators

length	0.12 mm
depth	0.03 mm

Caudicle

bulb diam.	?
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Translator Type: d/o

Pollinia inner end type: T

Caudicle bulb: ?

Retinacula character: LN

Hoya incrassata Warburg 1904

Flower from clone #90143 flowered in Fresno, CA.



Pollinarium picture with the monocular scope enlarged about 165x. Inner lobes of pollinia truncate inward, outer pellucid edge curved in near outer apex. Translators tight to sides, rather wide, caudicle bulb difficult to detect. Retinacula large proportionately little definition, short extensions.

Pollinium

length	0.46 mm
widest	0.16 mm

Retinaculum

length	0.20 mm
shoulder	0.08 mm
waist	0.08 mm
hip	0.09 mm
extensions	0.03 mm

Translators

length	0.12 mm
depth	0.04 mm

Caudicle

bulb diam.	0.05 mm
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Translator Type: d/o

Pollinia inner end type: F

Caudicle bulb: G

Retinacula character: E

Notation: It has been inferred that this species is synonymous with *Hoya crassicaulis* (Elmer) ex Kloppenburg. Compare the floral details in this folder with that of the other. There are many differences among others the rarity of this species in comparison to the other.

Hoya forbesii King & Gamble 1903



Pollinarium enlarged about 165x. It has an unusually long narrow retinaculum.

Pollinium

length	0.46 mm
widest	0.19 mm

Retinaculum

length	0.22 mm
shoulder	0.07 mm
waist	0.02 mm
hip	0.05 mm
ext.	0.03 mm

Translators

length	0.10 mm
depth	0.03 mm

Caudicle

bulb diam.	0.06 mm
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Translator Type: d/o

Pollinia inner end type: R

Caudicle bulb: C

Retinacula character: E

Translators are very upright, otherwise deltoid, caudicles not in clear focus appear as a shadow at lower apex of pollinium. Pollinia are widest toward inner apex, apex away from the caudicle.

Hoya auripigmenta Kloppenburg & Mendoza
(unpublished) GM #139



Pollinarium enlarged ca.
120x.

Pollinium

length 0.45 mm
widest 0.21 mm

Retinaculum

length 0.15 mm
shoulder 0.15 mm
waist 0.07 mm
hip 0.10 mm
ext. 0.04 mm

Translator

length 0.15 mm
wide 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
d/o

Pollinia inner apex type: R

Caudicle bulb: C ?

Retinacula character: S

Hoya benstoneana Kloppenburg, Siar, Mendoza, Guevarra &
Carandang 2013
ISSN #1655-3179 Type clone



Pollinarium
enlarged about
165x.

Pollinium

length 0.45 mm
widest 0.18 mm

Retinaculum

length 0.15 mm
shoulder 0.12 mm
waist 0.05 mm
hip 0.10 mm
ext. 0.03 mm

Translator

length 0.10 mm
depth 0.06 mm

Caudicle

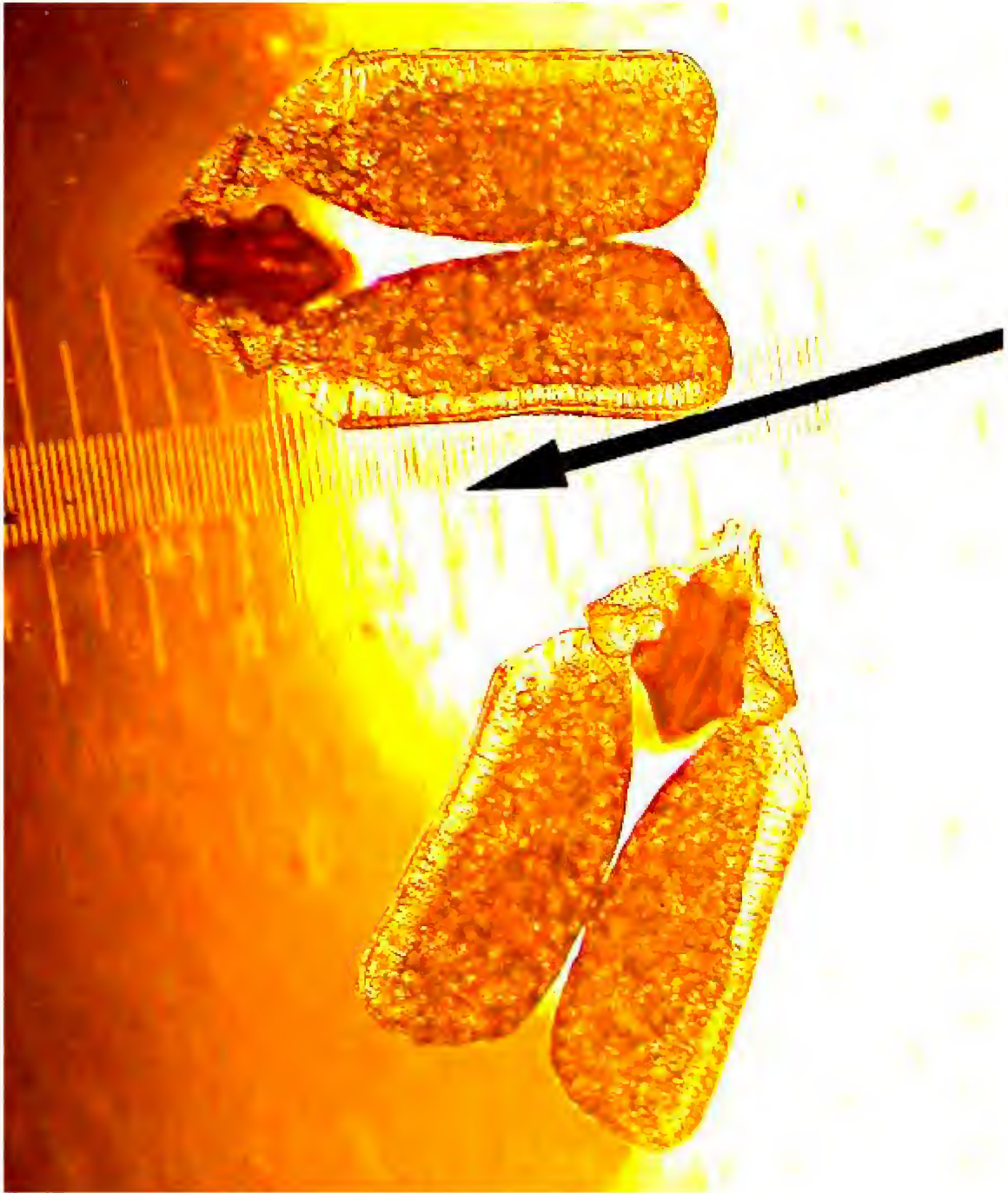
bulb diam. 0.09 mm

Ratio: pol.l/w 2.5
pol.l/ret 3.0

Translator/caudicle type: d/o
Pollinia inner apex type: RT

Caudicle bulb: G
Retinacula character: S

Hoya marizae Kloppenburg & Mendoza
(unpublished) GM #27



Pollinarium enlarged ca. 150x

Pollinium: length 0.45 mm; widest 0.18 mm

Retinaculum: length 0.19 mm; shoulder 0.14 mm; waist & hip 0.09 mm; ext. 0.04 mm

Translator: length 0.10 mm; widest 0.06 mm

Caudicle bulb diam: 0.06 mm

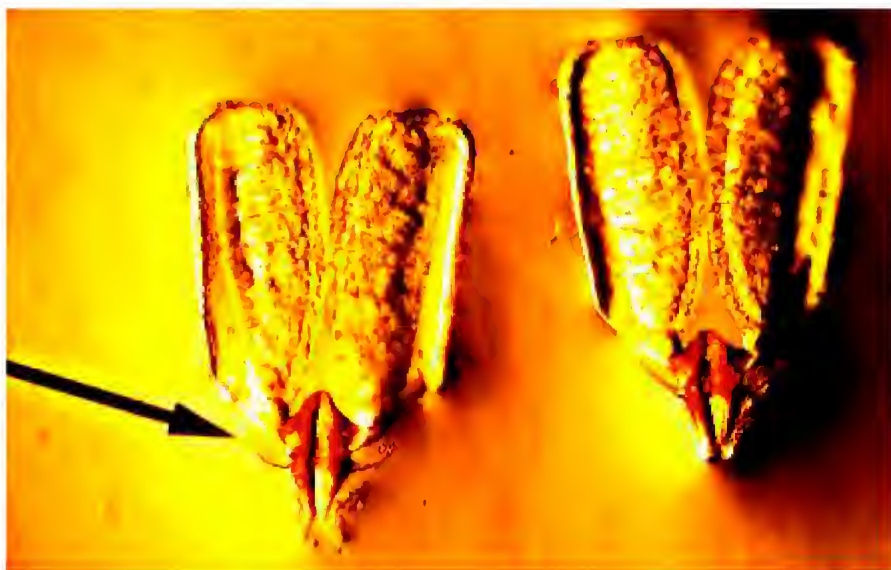
Translator/caudicle type: d/o

Pollinia end type: RT

Caudicle bulb: G

Retinacula character: S

Hoya persicina Kloppenburg, Siar, G. Mendoza, Guevarra &
Carandang 2013 ISSN #6155-3179 **Type** clone



Pollinaria enlarged about 165x.

Pollinium

length	0.45 mm
widest	0.19 mm

Retinaculum

length	0.10 mm
shoulder	0.12 mm
waist	0.08 mm
hip	0.09 mm
extensions	0.09 mm

Translator

length	0.10 mm
wide	0.03 mm

Caudicle

bulb diam.	0.06 mm
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Type: C

Retinacula character: S

Ratio: poll./width	2.4
Pol./ret.	2.4

Translator/caudicle type: d/o

Pollinia apex type: R

Hoya persicina subsp. rosea Kloppenburg, Mendoza & Ferreras
 Pub. In Jour. Of Nature Studies 12 (1) 25-29. 2013. ISSN 2329-7336



Pollinarium enlarged ca. 189x

Pollinia inner end type: R

Pollinarium

length	0.45 mm
widest	0.18 mm

Translator

length	0.11 mm
widest	0.04 mm

Translator/caudicle type: d/o

Caudicle bulb: G

Retinacula character: S

Retinaculum

length	0.15 mm
shoulder	0.12 mm
waist	0.07 mm
hip	0.08 mm
ext.	0.07 mm

Caudicle bulb diameter 0.06 mm

Hoya crassicaulis subsp. mendozae Kloppenburg
(unpublished) GM #6 or #127 ?



Pollinarium
enlarged ca. 152x.

Pollinium

length 0.45 mm
widest 0.12 mm

Retinaculum

length 0.20 mm
shoul. 0.09 mm
waist 0.04 mm
hip 0.05 mm
ext. 0.04 mm

Translator

length 0.10 cm
depth 0.03 mm

Caudicle

bulb 0.05 mm

Translator/caudicle Type: d/o

Ratios: p/w 3.8 p/r 2.3

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: HE

Hoya persicina subsp. inawaensis Kloppenburg & Mendoza
(unpublished) GM #146



Pollinarium enlarged 140x.

Pollinium

length	0.45 mm
widest	0.20 mm

Retinaculum

length	0.15 mm
shoulder	0.15 mm
waist	0.06 mm
hip	0.09 mm
ext.	0.05 mm

Translator

length	0.10 mm
widest	0.05 mm

Caudicle

bulb diam.	0.06 mm
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Translator/caudicle type:
d/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya auripigmenta subsp. papillata Kloppenburg & Mendoza
(unpublished) GM #162



Pollinarium enlarged 280x

Pollinium

length	0.45 mm
widest	0.20 mm

Retinaculum

length	0.13 mm
shoulder	0.15 mm
waist	0.07 mm
hip	0.11 mm
ext.	0.08 mm

Translator

length	0.10 mm
widest	0.09 mm

Caudicle

bulb diam.	0.06 mm
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Translator/caudicle type:
d/o

Pollinia apex type: F

Caudicle bulb: C

Retinacula character: S

***Hoya cardiophylla* Merrill 1920**

Flowered at Fresno, CA. from clone #910301 DH.
cupped coronal lobes.



Magnified approximately 165x.

Pollinium

length: 0.45 mm
widest: 0.14 mm

Retinaculum

length: 0.18 mm
shoulder: 0.07 mm
waist: 0.05 mm
hip: 0.08 mm
ext.: 0.08 mm

Translators

length: 0.10 mm
depth: 0.04 mm

Caudicle

bulb diam.: 0.06 mm

Type: C

Translator/caudicle type: d/o

Pollinia apex type: RT

Retinacula character: LS

Hoya velasioii subsp. grandiora Kloppenburg 2015

CAHUP 18682 JP Determined to be same as DH 910301.



Pollinarium enlarged about 165x. Pollinia are laying slanted so full extent of breadth can not be measured in this photo.

Pollinium

length	0.45 mm
widest	0.13 mm

Retinaculum

length	0.20 mm
shoulder	0.08 mm
waist	0.04 mm
hip	0.08 mm
ext.	0.03 mm

Translator

length	0.07 mm
depth	0.01 mm

Caudicle bulb is here oval
0.03 x 0.06 mm

Translator/caudicle type: d/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: LS

Caudicle bulb: G
Retinacula character: LS

Hoya alwitriana Kloppenburg, Siar, Guevarra & Carandang 2012
Type clone



Pollinarium above enlarged about 150x
This species was difficult as the long retinaculum with the translators attached well down from the long inner head tended to twist and rise off the slide. Pict. #2 is of the retinaculum and shows how long the inner end is.

Pollinium

length	0.44 mm
widest	0.17 mm

Ratios: pollinium length/widest 2.6

Translator/caudicle type: d/o

Retinaculum

length	0.19 mm
shoulder	0.08 mm
hip	0.06 mm
waist	0.07 mm
ext.	0.06 mm

Pollinia inner end: T

Translators

length	0.09 mm
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Retinacula character: LS

Caudicle

bulb. diam.	0.05 mm
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* the caudicle end to which the pollinia basal end is stuck (in this case a clear ovate ball)

Type: C

Hoya aurantiaca subsp. lagyoensis Kloppenburg & Mendoza



Pollinarium enlarged ca.
160x.

Pollinium

length 0.44 mm
widest 0.20 mm

Retinacula

length 0.14 mm
shoulder 0.13 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.04 mm

Translator

length 0.10 mm
widest 0.05 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
d/o

Pollinia inner end type: T

Retinacula type: S

Hoya bakyaanensis Kloppenburg & Mendoza
(unpublished) GM #149



Pollinarium enlarged 150x.

Pollinium

length 0.44 mm
widest 0.20 mm

Retinaculum

length 0.10 mm
shoulder 0.15 mm
waist 0.05 mm
hip 0.09 mm
ext. 0.06 mm

Translator

length 0.11 mm
wide 0.04 mm

Caudicle

bulb 0.06 mm

Translator/caudicle type:
d/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya sp. EG 06097
Flower 9/8/00 at Pearl City, Hawaii.



Pollinarium enlarged about 165x.

Pollinia

length	0.44 mm
widest	0.16 mm

Retinaculum

length	0.13 mm to ext.
shoulder	0.10 mm
waist	0.07 mm
hip	0.08 mm
extensions	0.07 mm

Translator

length	0.07 mm
depth	0.05 mm
width	0.01 mm

Caudicle

bulb diam.	0.06 mm
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Translator/caudicle type: d/o

Pollinia apex type: RT

Caudicle bulb: C

Retinacula character: S

Hoya latifolia ?

From Ric Moreia, St. Petersburg, Florida



Pollinia

length	0.44 mm
widest	0.15 mm

Retinacula

length	0.12 mm
shoulder	0.10 mm
waist	0.05 mm
hip	0.09 mm
ext.	0.07 mm

Translators

length	0.11 mm
depth	0.06 mm
width	0.01 mm

Caudicle

bulb diam.	0.05 mm
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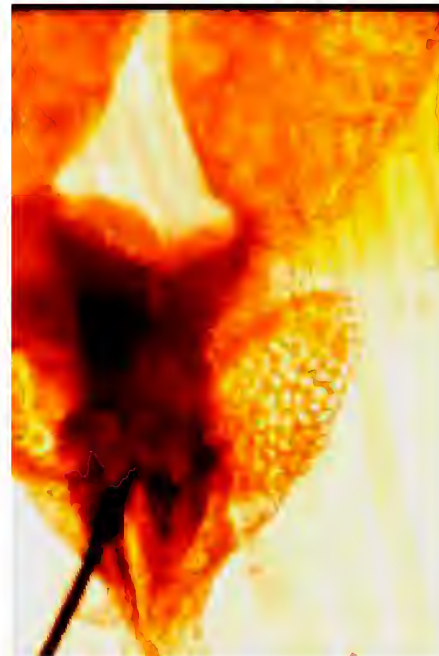
Another view showing the translator in detail.

Translator/caudicle type: d/o

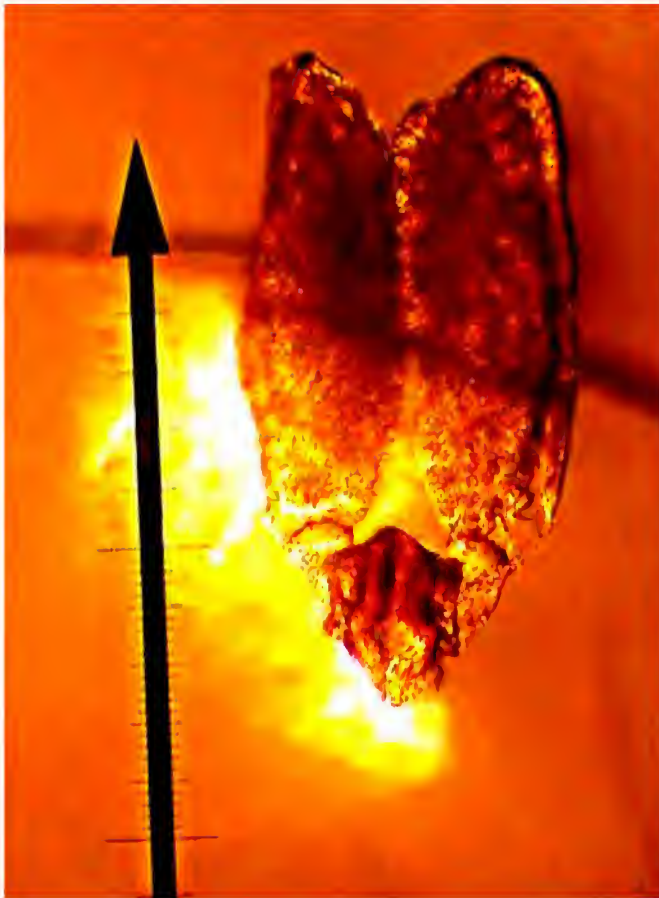
Pollinia inner apex type: T

Caudicle bulb: G

Retinacula character: HU



Hoya armeniaca Kloppenburg & Mendoza
(unpublished) GM #54



Pollinarium enlarged ca.
120x.

Pollinium

length 0.43 mm
widest 0.15 mm

Retinaculum

length 0.12 mm
shoulder 0.12 mm
waist 0.10 mm
hip 0.11 mm
ext. 0.03 mm

Translator

length 0.07 mm
depth 0.04 mm

Caudicle

bulb diam. 0.07 mm

Translator/caudicle type: d/o

Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: S

Pollinia Types 2017-4B

d/o

88. *Hoya lucardenasiana* Kloppenburg & Siar 2009
89. *Hoya polilloensis* Kloppenburg, Guevarra, Mendoza & Ferreras 2013
90. *Hoya* sp. **PNH 11859**
91. *Hoya* sp. **NS05-206**
92. *Hoya annaleesoligamae* Kloppenburg 2017
93. *Hoya gelba* Kloppenburg, Guevarra & Carandang 2013
94. *Hoya katherinechallisiana* Kloppenburg & Mendoza
95. *Hoya persicina* subsp. **tagumpayensis** Kloppenburg & Mendoza
96. *Hoya persicina* subsp. **tingkoyanensis** Kloppenburg & Mendoza
97. *Hoya blashernaezii* subsp. **tingkoyanensis** Kloppenburg & Mendoza
98. *Hoya eburna* Kloppenburg, Guevara & Carandang 2013
99. *Hoya cremora* Kloppenburg & Mendoza
100. *Hoya faoensis* Kloppenburg & Siar 2008
101. *Hoya* sp. **CAHUP 5967**
102. *Hoya retusa* Dalzell 1852
103. *Hoya* sp. **PNH 4854**
104. *Hoya* sp. **W 8508**
105. *Hoya renuncola* Kloppenburg & Mendoza
106. *Hoya markoi* Kloppenburg & Mendoza
107. *Hoya blashernaezii* subsp. **inawaensis** Kloppenburg & Mendoza
108. *Hoya blashernaezii* subsp. **infantaensis** Kloppenburg & Mendoza
109. *Hoya blashernaezii* subsp. **lagyoensis** Kloppenburg & Mendoza
110. *Hoya blashernaezii* subsp. **straminea** Kloppenburg & Mendoza
111. *Hoya blashernaezii* subsp. **tangerina** Kloppenburg & Mendoza
112. *Hoya blashernaezii* subsp. **truncata** Kloppenburg & Mendoza
113. *Hoya blashernaezii* subsp. **lalawinanensis** Kloppenburg & Mendoza
114. *Hoya blashernaezii* subsp. **nuevavizcayensis** Kloppenburg & Mendoza
115. *Hoya lagyaensis* Kloppenburg & Mendoza
116. *Hoya afuangae* Kloppenburg & Cajano
117. *Hoya polystachya* Blume 1849
118. *Hoya moninae* Kloppenburg & Cajano 2014
119. *Hoya mamagongensis* Kloppenburg & Mendoza
120. *Hoya ferrerassii* Kloppenburg & Siar 2010
121. *Hoya tagumpayensis* Kloppenburg & Mendoza
122. *Hoya blashernaezii* subsp. **siariae** Kloppenburg 2014
123. *Hoya kamgongensis* Kloppenburg & Mendoza
124. *Hoya blashernaezii* subsp. **vadacorolla** Kloppenburg & Mendoza
125. *Hoya eburna* subsp. **infantaensis** Kloppenburg & Mendoza
126. *Hoya* sp. **CAHUP 5269**
127. *Hoya sulu-anensis* Kloppenburg & Mendoza
128. *Hoya blashernaezii* subsp. **mendozai** Kloppenburg
129. *Hoya lambioae* Kloppenburg, Guevarra, Cajano, & Carandang 2015

- 130. **Hoya blashernaezii subsp. armerina** Kloppenburg & Mendoza
- 131. **Hoya sp.** IPPS 8860
- 132. **Hoya tomataensis** Green and Kloppenburg 2004
- 133. **Hoya blashernaezii subsp. kamagongensis** Kloppenburg & Mendoza
- 134. **Hoya blashernaezii subsp. parviora** Kloppenburg & Mendoza
- 135. **Hoya blashernaezii subsp. nagcarlanensis** Kloppenburg & Mendoza
- 136. **Hoya blashernaezii subsp. simeonae** Kloppenburg & Mendoza
- 137. **Hoya polystachya alba**
- 138. **Hoya salmonea** Kloppenburg, Guevarra, Mendoza & Ferreras 2013
- 139. **Hoya salmonea subsp. pallida** Kloppenburg, Mendoza & Ferreras 2013
- 140. **Hoya blashernaezii subsp. luzonensis** Kloppenburg & Mendoza
- 142. **Hoya blashernaezii subsp. rosea** Kloppenburg
- 143. **Hoya bifunda subsp. obtusa** Kloppenburg & Mendoza
- 144. **Hoya nakarensis** Kloppenburg, Mendoza & Ferreras 2013
- 145. **Hoya albida** Kloppenburg, Cajano, Guevarra & Carandang 2013
- 146. **Hoya maubanensis** Kloppenburg & Mendoza
- 147. **Hoya williamsiana** Klopp., Siar, Mendoza, Cajano, Guevarra & Carandang 2013

Hoya lucardenasiana Kloppenburg & Siar 2009 Type clone



Pollinarium
enlarged about
165x.

Pollinium

length 0.43 mm
widest 0.14 mm

Retinaculum

length 0.23 mm
shoulder 0.13 mm
waist 0.12 mm
hip 0.13 mm
ext. 0.05 mm

Translator

length 0.14 mm
depth 0.03 mm

Caudicle bulb

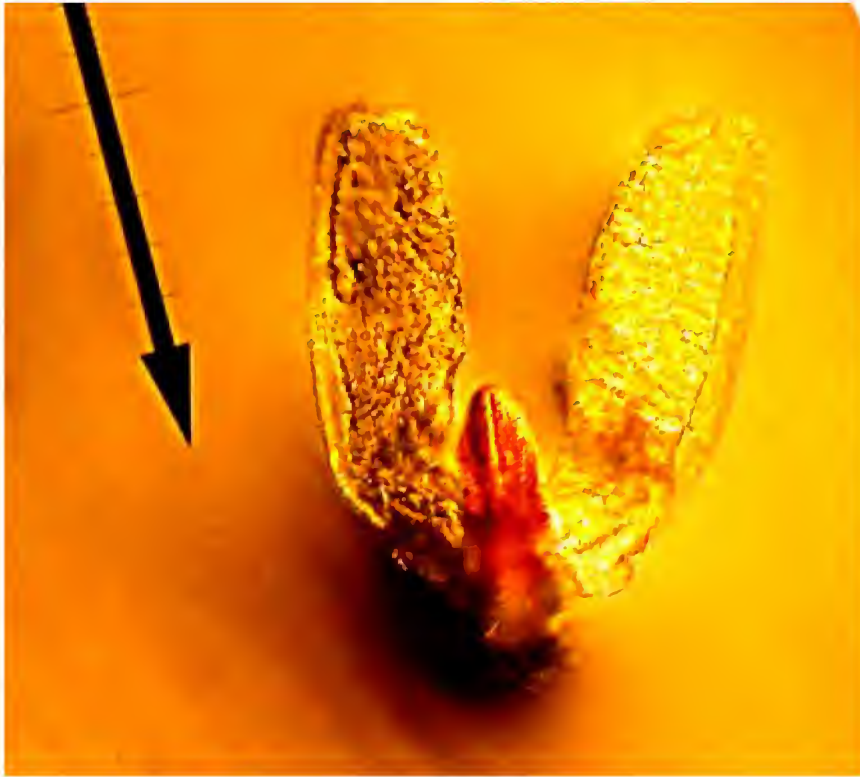
diam. 0.08 mm

Translator/caudicle type: d/o

Pollinia inner end type: T

Caudicle bulb: ?

Retinacula character: HE
Hoya polilloensis Kloppenburg, Guevarra, Mendoza & Ferreras
2013



Pollinarium
enlarged ca. 160x.

Pollinarium

length 0.43 mm
widest 0.16 mm

Retinaculum

length 0.19 mm
shoulder 0.07 mm
waist 0.06 mm
hip 0.07 mm
ext. 0.03 mm

Translator

length 0.07 mm
depth 0.03 mm

Caudicle

bulb diam. 0.06 mm

Type: G

Translator/caudicle type: d/o

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: E

Hoya sp. PNH 11859

Species found by G. E. Edano 12 March 1950 at Antilao River, Ormoc, Leyte, Philippines. Field No. 2018, along a ridge in forest, elevation 500 meters. Flower green, fruit green.

Pollinarium enlarged about 110x Pollinia outer apices taper inwardly.



Pollinia

length	0.43 mm
widest	0.13 mm

Retinaculum

length	0.23 mm
shoulder	0.09 mm
waist	0.03 mm
hip	0.06 mm
extensions	rudimentary.

Translator

length	0.07 mm
depth	0.02 mm.

Caudicle

bulb diam.	0.06 mm.
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Translator/caudicle type: d/o

Pollinia inner end type: F

Caudicle bulb: ?

Retinacula character: LS

Hoya sp. NS05-206



Pollinarium enlarged about 165x.

Scale: black arrow lines on stem are 0.05 mm. as is the base of the head. Arrow is 0.10 mm. long,

The pellucid edge runs over the rounded inner end of the pollinia and well down the sides to just above where they pollinium is stuck into the clear caudicle bulb.

Extensions arise from the hip sides and here are well developed. Measured only the dark portion below.

Pollinarium:

length	0.42 mm
widest	0.14 mm

Retinaculum:

length	0.11 mm
shoulder	0.11 mm
waist	0.07 mm
hip	0.08 mm
ext.	0.06 mm

Translators:

length	0.09 mm
depth	0.05 mm

Caudicle:

bulb diam.	0.06 mm
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Caudicle bulb: ?

Ret.: pol. ratio 1:3.1

Translator/caudicle: d/o

Retinacula character: S

Pollinia inner end type: R

Hoya annaleesoligamae Kloppenburg 2017

CAHUP 63927

23 Oct. 2006: see 81100 = quinquinervia



Pollinarium
enlarged about
165x.

Pollinium

length	0.42 mm
widest	0.15 mm

Retinaculum

length	0.18 mm
shoulder	0.07 mm
waist	0.04 mm
hip	0.07 mm
ext.	0.04 mm

Translators

length	0.04 mm
depth	0.02 mm

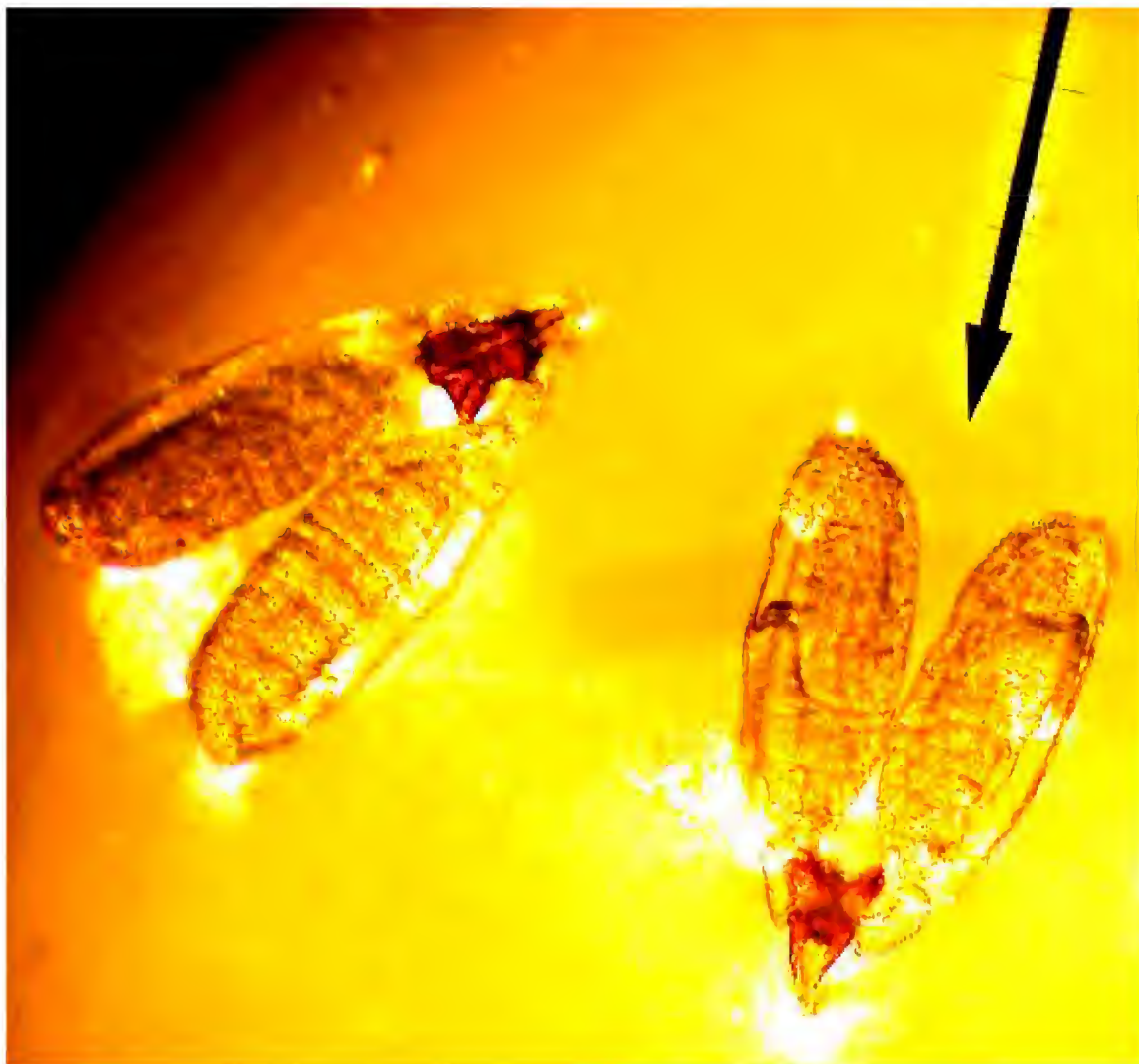
Caudicle

Ratio: ret length/ poll. length 3.2
pol. width/pol. length 2.8

Translator/caudicle: d/o
Pollinia inner end type: F
Caudicle bulb: C

bulb diam. 0.05 mm **Retinacula character: LS**
Hoya gelba Kloppenburg, Guevarra & Carandang 2013 Type clone

Pollinarium enlarged about 200x.



Pollinium

length 0.42 mm
widest 0.18 mm

Retinaculum

length 0.17 mm
shoulder 0.10 mm
waist 0.05 mm
hip 0.07 mm
ext. 0.04 mm

Translator

length 0.08 mm
depth 0.03 mm

Caudicle

bulb diam. 0.05 mm

Retinacula character: HU

Translator/caudicle: d/o

Pollinia inner end type: R

Caudicle bulb: G

Ratio: pol./widest 2.3
pol./ret. 2.0

Hoya katherinechallisiana Kloppenburg & Mendoza
(unpublished) GM #150



Pollinarium enlarged ca.
150x.

Pollinium

length 0.42 mm
widest 0.20 mm

Retinaculum

length 0.14 mm
shoulder 0.16 mm
waist 0.08 mm
hip 0.11 mm
ext. 0.07 mm

Translator

length 0.10 mm
wide 0.03 mm

Caudicle

bulb diam. 0.06 mm

Translator/caudicle type:
d/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya persicina subsp. tagumpayensis Kloppenburg & Mendoza
(unpublished) GM #144



Pollinarium enlarged 100x

Pollinium

length 0.42 mm
widest 0.19 mm

Retinaculum

length 0.12 mm
shoulder 0.15 mm
waist 0.07 mm
hip 0.09 mm
ext. 0.05 mm

Translator

length 0.10 mm
widest 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
ls/o but nearly d/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya persicina subsp. tinkoyanensis Kloppenburg & Mendoza
(unpublished) GM #135



Pollinarium enlarged
ca. 150x.

Pollinium

length 0.42mm
widest 0.19 mm

Retinaculum

length 0.16 mm
shoulder 0.12 mm
waist 0.08 mm
hip 0.11 mm
ext. 0.05 mm

Translator

length 0.10 mm
wide 0.03 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle
type: d/o

Pollinia apex type: RT

Caudicle bulb: C ?

Retinacula character: S

Hoya blashernaezii subsp. tinkoyanensis Kloppenburg &
Mendoza
(unpublished) GM #119



Pollinarium enlarged ca.
90x.

Pollinium

length 0.42 mm
widest 0.19 mm

Retinaculum

length 0.15 mm
shoulder 0.14 mm
waist 0.05 mm
hip 0.07 mm
ext. 0.03 mm

Translator

length 0.10 mm
wide 0.02 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type: d/o

Pollinia inner apex type: T

Caudicle bulb: C

Retinacula character: S

Hoya eburna Kloppenburg, Guevara & Carandang 2013
Type clone



Pollinarium
enlarged ca. 140x.

Pollinium

length 0.41 mm
widest 0.18 mm

Retinaculum

length 0.16 mm
shoulder 0.12 mm
waist 0.06 mm
hip 0.08 mm
ext. 0.02 mm

Translator

length 0.11 mm
widest 0.05 mm

Caudicle

bulb diam. 0.05 mm

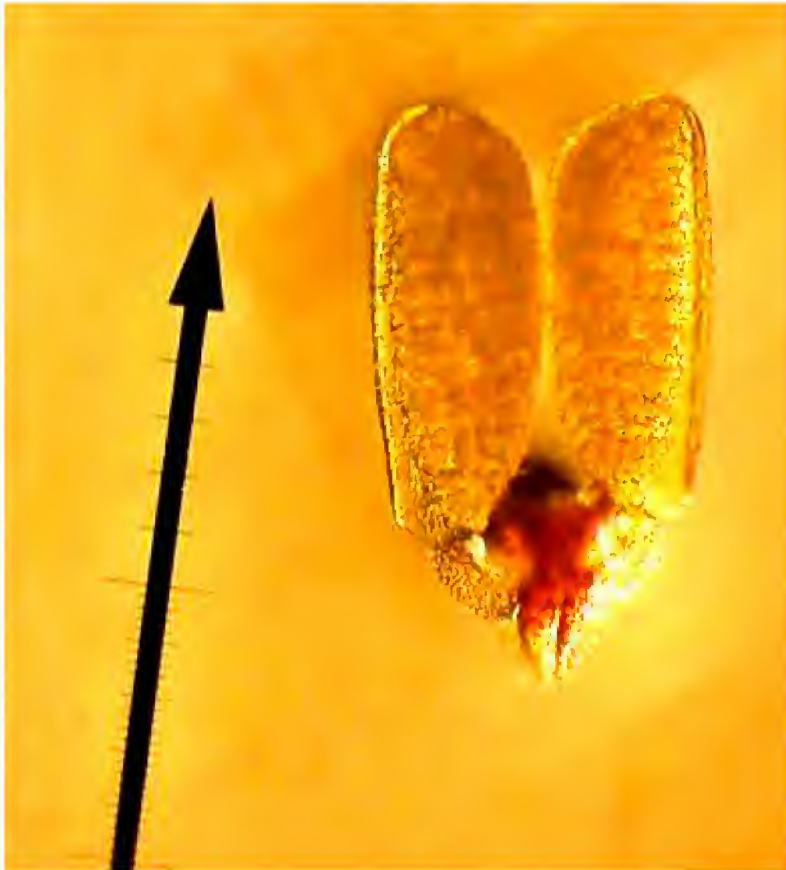
Translator type:
d/o

Pollinia inner apex
type: RT

Caudicle bulb: G

Retinacula
character: S

Hoya cremora Kloppenburg & Mendoza
(unpublished) GM #52



Pollinarium enlarged ca,
150x.

Pollinium

length 0.41 mm
widest 0.19 mm

Retinaculum

length 0.12 mm
shoulder 0.10 mm
waist 0.06 mm
hip 0.07 mm
ext. 0.05 mm

Translator

length 0.11 mm
widest 0.03 mm

Caudicle

bulb diam. 0.04mm

Translator/caudicle
type: d/o.

Pollinia end type: R

Caudicle bulb: G

Retinacula character: HU

Hoya faoensis Kloppenburg & Siar 2008 Type clone



Retinaculum enlarged about 165x. Translator arm is attached to the right side and appear to enter the retinaculum well down on the side near the well rounded hip area, Extensions are very short.

Pollinarium enlarged about 165x. Pollinia are a little shriveled. The shoulder wings extend back from a rounded head, also the same for the waist area. Caudicles are difficult to discern.

Pollinium

length	0.41 mm
widest	0.20 mm

Retinaculum

length	0.11 mm
shoulders	0.14 mm
waist	0.06 mm
hip	0.12 mm
extensions	0.03 mm

Translators

length	0.10 mm
depth	0.02 mm

Caudicle bulb diameter 0.05 mm

Translator/caudicle type: d/o

Pollinia end type: T

Caudicle bulb: G

Retinacula character: S



Hoya sp. CAHUP 5967

Labeled *Hoya incrassata*. Most likely correct pollinium a little shorter.



Image of the pollinarium above is enlarged about 165x

Pollinium

length	0.41 mm
Widest	0.15 mm

Retinaculum

length	0.17 mm to crotch
shoulders	0.08 mm not easy to differentiate
narrowest	0.03 mm
extensions	0.04 mm

Translators

length	0.11 mm
depth	0.04 mm fiddle shaped, broad

Caudicle

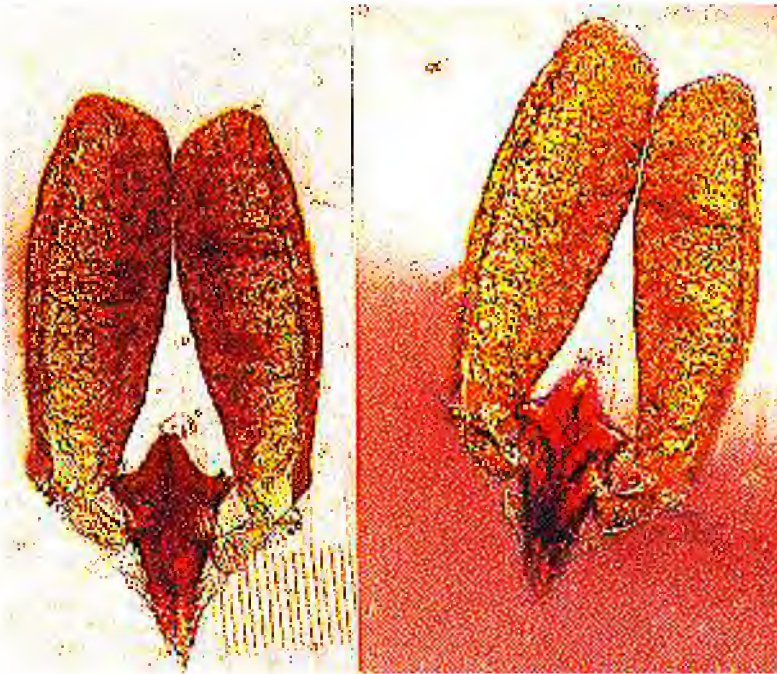
bulb diam.	0.05 mm difficult to differentiate, best on left side.
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Translator/caudicle type: d/o

Pollinia end type: RT

Hoya retusa Dalzell 1852

Flowers from Eva-Karin Wiberg, Sweden 5/28/97



Two pictures of the pollinarium the left one showing the retinaculum from the front view Showing the translator arms entering at about the waist area and the one on the right the back side of the retinaculum Here you can see through the thin walled entry cavities into where the translators and the caudicles enter and are attached above. The retinacular shoulder is curved upward at the outer ends the waist is narrow hips plainly visible in the

right picture.

Pollinia

length	0.41 mm
widest	0.14 mm

Retinaculum

length	0.24 mm long including extensions
shoulders	0.14 mm
waist	0.09 mm
extensions ca.	0.07 mm.

Translators

length	0.08 mm long (outside retinacula);
depth	0.03 mm
wide	0.01 mm

Caudicles

bulb diam.	0.06 mm, slightly stippled.
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Translator/caudicle type: d/o

Pollinia end type: R?

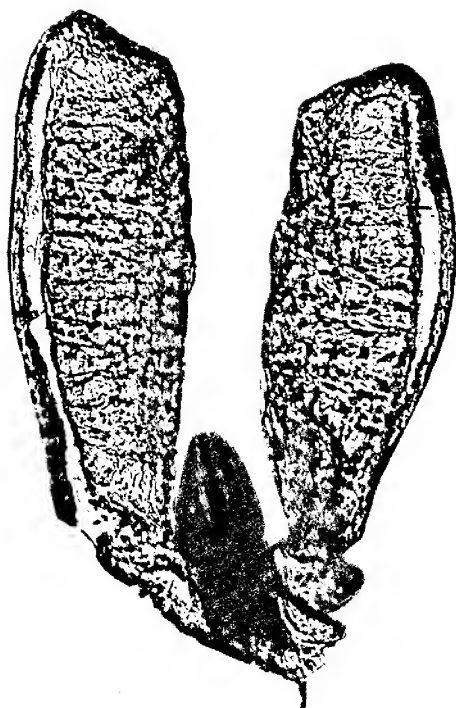
Caudicle bulb: G

Retinacula character: S or HU

Hoya sp. PNH 4854
Gaerlan, Sagcal & Fernando 10/10/91

Dinagat, Mindanao, Philippines.

Magnified approximately 165x.



Pollinium

length: 0.41 mm
widest: 0.16 mm

Retinaculum

length: 0.18 mm
shoulder: 0.08 mm
waist: 0.05 mm
hip: 0.06 mm
ext.: 0.04 mm

Translators

length: 0.10 mm
depth: 0.02 mm

Caudicle

bulb. diam.: 0.08 mm

Translator/caudicle type: d/o

Pollinia inner end type: F

Caudicle bulb: G

Retinacula character: HE

Hoya sp. W 8508

W 8508 Hoya pottsii.....not correct as this sp. not in Samoa.



Pollinarium enlarged about 150x.

Pollinia

length	0.40 mm
widest	0.22 mm

Retinaculum

length	0.13 mm
shoulder	0.11 mm
waist	0.09 mm
hip	0.10 mm
ext.	0.05 mm

Translator

length	0.10 mm
depth	0.05 mm

Caudicle

bulb diam.	0.07 mm
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Pollinia inner apex type: RF

Translator/caudicle type: d/o

Caudicle bulb: G

Retinacula character: S

Hoya renuncola Kloppenburg & Mendoza
(unpublished) GM #167



Pollinarium enlarged 110x.

Pollinium

length 0.40 mm
widest 0.20 mm

Retinaculum

length 0.12 mm
shoulder 0.13 mm
waist 0.09 mm
hip 0.10 mm
ext. 0.10 mm

Translator

length 0.10 mm
widest 0.04 mm

Caudicle

bulb 0.05 mm x 0.05 mm

Translator/ caudicle type:
d/o

Translators have scaly surfaces and the caudicles are clear.

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya markoi Kloppenburg & Mendoza
(unpublished) GM #61



Pollinarium
enlarged ca. 180x.

Pollinium

length 0.40 mm
widest 0.15 mm

Retinacula

length 0.12 mm
shoulder 0.10 mm
waist 0.06 mm
hip 0.07 mm
ext. 0.03 mm

Translator

length 0.10 mm
widest 0.04 mm

Caudicle

bulb diam. 0.04 mm

Translator/caudicle type: d/o

Pollinia end type: R

Caudicle bulb: G

Retinacula character: S

Hoya blashernaezii subsp. inawaensis Kloppenburg & Mendoza
(unpublished) GM #118



Pollinarium enlarged ca.
80x.

Pollinarium

length	0.40 mm
widest	0.21 mm

Retinaculum

length	0.15 mm
shoulder	0.15 mm
waist	0.08 mm
hip	0.10 mm
ext	0.05 mm

Translator

length	0.12 mm
wide	0.06 mm

Caudicle

bulb diam.	0.05 mm
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Translator/caudicle type:
d/o

Pollinia apex type: RT

Caudicle bulb: C

Retinacula character: S

Hoya blashernaezii subsp. infantaensis Kloppenburg & Mendoza
(unpublished) GM #8



Pollinarium enlarged ca.
160x.

Pollinium

length	0.40 mm
widest	0.21 mm

Retinaculum

length	0.18 mm
shoulder	0.18 mm
waist	0.08 mm
hip	0.09 mm
ext.	0.06 mm

Translator

length	0.12 mm
depth	0.05 mm

Caudicle

bulb diam.	0.05 mm
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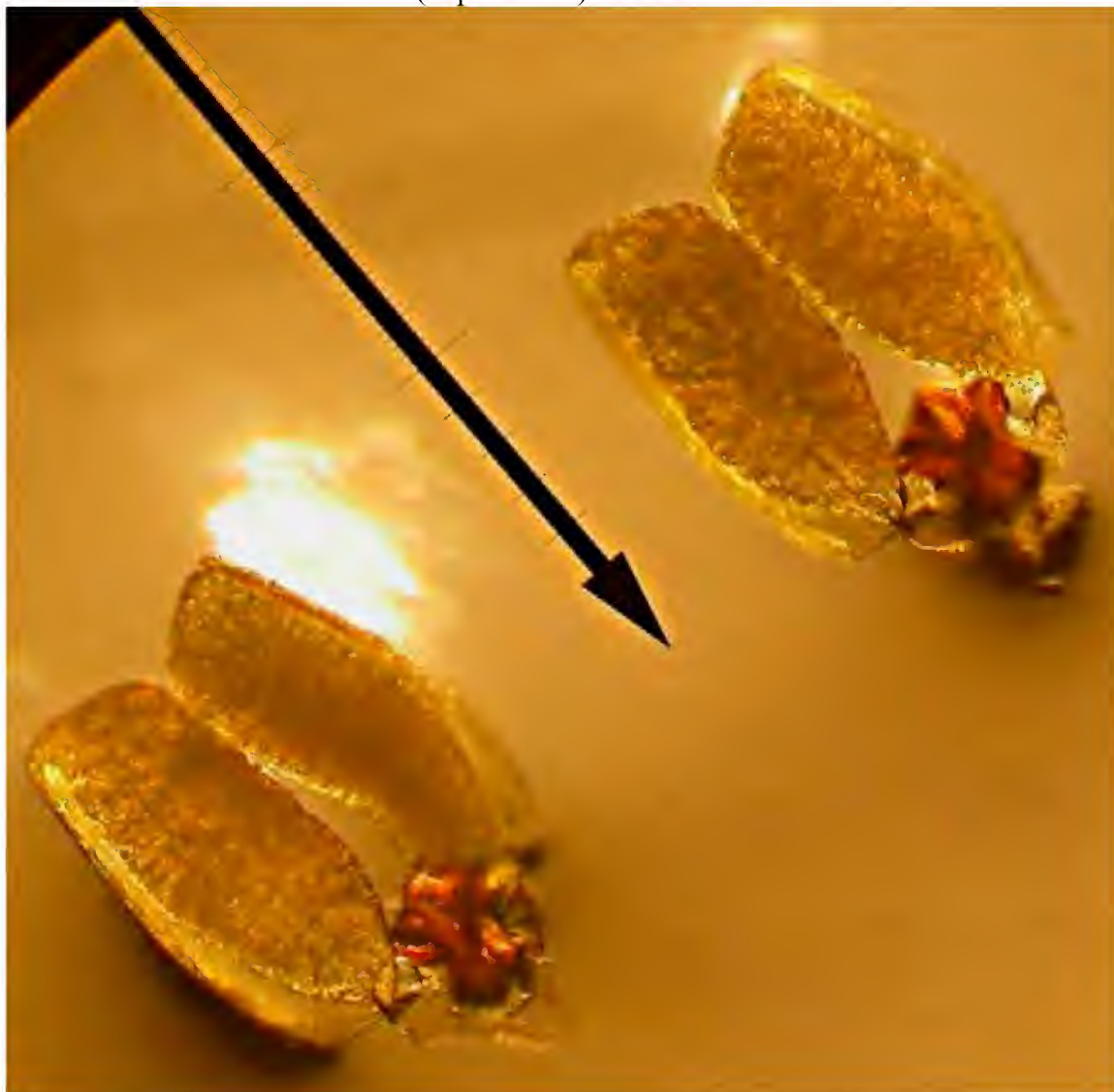
Translator/caudicle type:
d/o

Pollinia apex type: T

Caudicle bulb: G ?

Retinacula character: S

Hoya blashernaezii subsp. lagyoensis Kloppenburg & Mendoza
(unpublished) GM #123



Two pollinarium enlarged ca. 140x.

Pollinium

length	0.40 mm
widest	0.17 mm

Caudicle

bulb diam.	0.05 mm
------------	---------

Retinaculum

length	0.15 mm
shoulder	0.13 mm
waist	0.08 mm
hip	0.10 mm
ext.	0.03 mm

Translator/caudicle type: d/o

Pollinia apex type: RT

Caudicle bulb: C

Translator

length	0.07 mm
depth	0.03 mm

Retinacula character: S
Hoya blashernaezii subsp. straminea Kloppenburg & Mendoza
(unpublished) GM #21



Pollinarium enlarged
ca. 210x

Pollinium

length 0.40 mm
widest 0.21 mm

Retinaculum

length 0.17 mm
shoulder 0.18 mm
waist 0.12 mm
hip 0.14 mm
ext. 0.06 mm

Translator

length 0.14 mm
depth 0.07 mm

Caudicle

diam. 0.07 mm

Translator/caudicle
Type: d/o

Pollinia inner end
type: T

Caudicle bulb: G

Retinacula character: S

Hoya blashernaezii subsp. tangerina Kloppenburg & Mendoza
(unpublished) GM #62



Pollinarium enlarged ca. 130x

Pollinium

length	0.40 mm
widest	0.21 mm

Translator

length	0.15 mm
depth	0.04 mm

Retinaculum

length	0.11 mm
shoulder	0.15 mm
waist	0.07 mm
hip	0.10 mm
ext	0.04 mm

Caudicle

bulb diam.	0.07 mm
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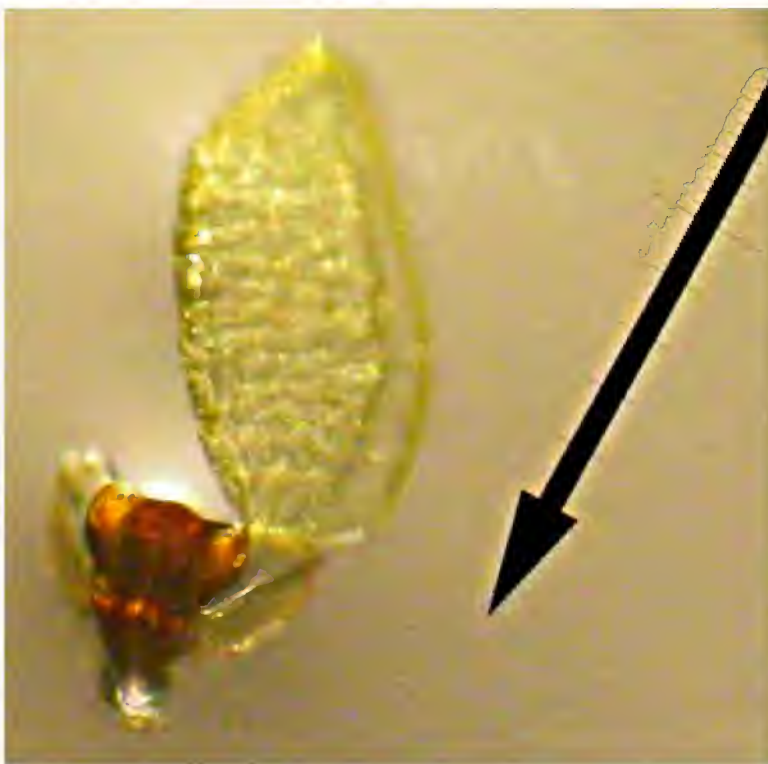
Translator/caudicle type: d/o most likely

Pollinia end type: RT

Caudicle bulb: C

Retinacula character: HU

Hoya blashernaezii subsp. truncata Kloppenburg & Mendoza
(unpublished) GM #132



Pollinarium enlarged ca. 170x.

Pollinium

length 0.40 mm
widest 0.20 mm

Retinaculum

length 0.13 mm
shoulder 0.14 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.03 mm

Translator

length 0.13 mm
widest 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type: d/o

Pollinia apex type: T

Caudicle bulb: C ?

Retinacula character: S

Hoya blashernaezii subsp. lalawinanensis Kloppenburg &
Mendoza
(unpublished) GM #128



Pollinarium enlarged ca. 126x.

Pollinium

length	0.40 mm
widest	0.21 mm

Caudicle

bulb diam.	0.06 mm
------------	---------

Retinaculum

length	0.18 mm
shoulder	0.12 mm
waist	0.08 mm
hip	0.09 mm
ext.	0.05 mm

Translator/caudicle type: d/o

Pollinia apex type: RT

Caudicle bulb: C

Translator

Retinacula character: S

length 0.11 mm
widest 0.05 mm

Hoya blashernaezii* subsp. *nuevavizcayensis Kloppenburg &
Mendoza
(unpublished) GM #145



Pollinarium enlarged ca.
140x.

Pollinium

length 0.39 mm
widest 0.20 mm

Retinaculum

length 0.13 mm
shoulder 0.12 mm
waist 0.10 mm
hip 0.12 mm
ext. 0.02 mm

Translator

length 0.10 mm
wide 0.03 mm

Caudicle

bulb diam. 0.06 mm

Translator/caudicle type:
d/o

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: S

Hoya lagyaensis Kloppenburg & Mendoza
(unpublished) GM #170



Pollinarium enlarged
180x.

Pollinium

length 0.39 mm
widest 0.17 mm

Retinaculum

length 0.10 mm
shoulder 0.13 mm
waist 0.06 mm
hip 0.10 mm
ext. 0.06 mm

Translator

length 0.06 mm
widest 0.03 mm

Caudicle

bulb diam. 0.04 mm

**Translator/caudicle
type:** d/o

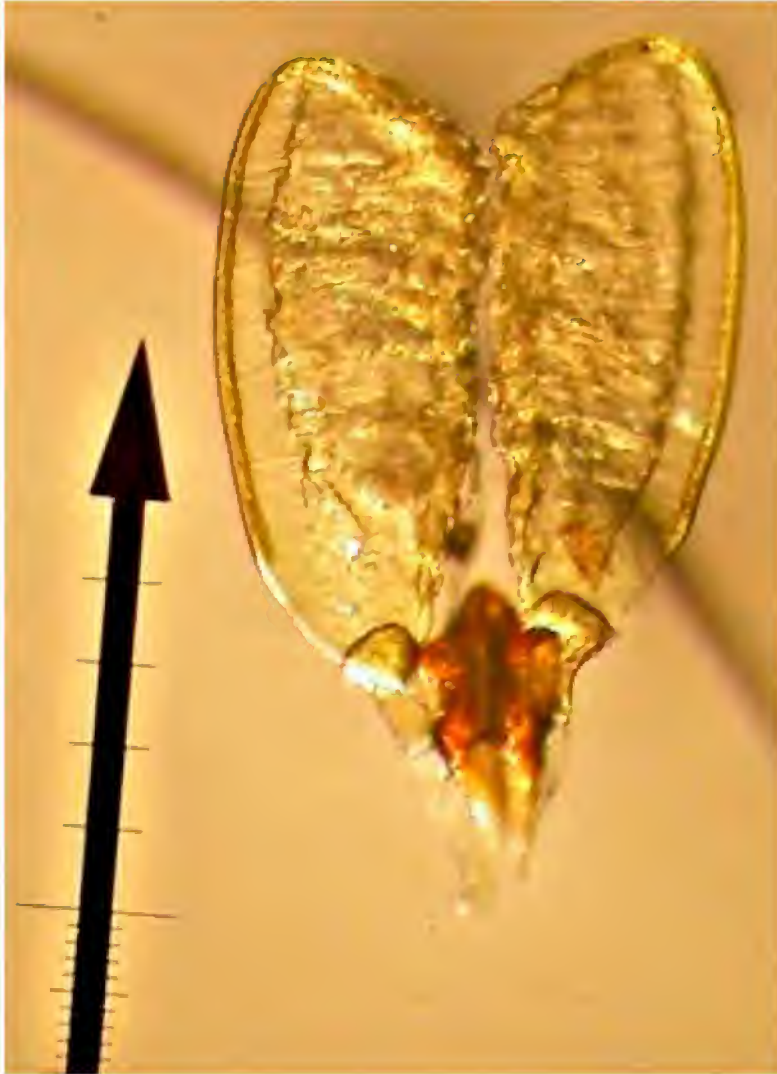
Caudicle bulb is clear.
Pollen grains not well
defined. Translators
rectangular.

Pollinia apex type: T

Retinacula type: S

Caudicle bulb: C

Hoya afuangae Kloppenburg & Cajano
(unpublished)



Pollinarium enlarged 200x

Pollinium

length 0.39 mm
widest 0.17 mm

Retinaculum

length 0.11 mm
shoulder 0.10 mm
hip 0.07 mm
waist 0.08 mm
ext. 0.08 mm
overall length 0.19 mm

Translator

length 0.05 mm
widest 0.03 mm

Translator/caudicle type:
d/o

Caudicle:

bulb diam. 0.06 x 0.04 mm

Caudicle: opaque

Pollinia ends: T

Retinacula type: S

Caudicle: C

Hoya polystachya Blume 1849



Pollinarium enlarged about 165x. It is not a large pollinarium. The pollinia are broad with rounded inner apices a well defined pellucid edge. The most striking thing here is the well defined and differentiated translators. supporting a small caudicle at least small at the bulbous apex.. Undifferentiated covers the retinaculum outer apical area.

Pollinium

length	0.39 mm
width	0.16 mm

Retinaculum

length	0.15 mm
shoulders	0.12 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.05 mm

Translators

length	0.09 mm
depth	0.06 mm

Caudicle

bulb diam.	0.07 mm
granulate	



Another photo of the pollinium showing the retinacula in more detail

Translator/caudicle type: d/o

Pollinia inner end type: RT

Caudicle bulb: G

Retinacula character: S

Hoya moninae Kloppenburg & Cajano 2014



Pollinarium enlarged about 165x.

Pollinium

length	0.39 mm.
widest	0.17 mm.

Retinaculum

length	0.11 mm.
shoulder	0.09 mm.
waist	0.03 mm.
hip	0.07 mm.
ext.	0.02 mm.

Translators

length	0.09 mm.
depth	0.04 mm.

Caudicle

bulb diam.	0.05 mm.
------------	----------

Caudicle bulb is relatively small.

Ratio: r/p 3
pl/pw 2.3

Translator/caudicle type:
d/o

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: S

Hoya mamagongensis Kloppenburg & Mendoza
(unpublished) GM #153



Pollinarium enlarged 140x.

Pollinium

length	0.39 mm
widest	0.18 mm

Retinaculum

length	0.16 mm
shoulder	0.13 mm
waist	0.06 mm
hip	0.09 mm
ext.	0.05 mm

Translator

length	0.15 mm
wide	0.04 mm

Caudicle

bulb diam.	0.06 mm
------------	---------

Translator caudicle type: d/o

Pollinia apex type: T

Caudicle bulb: ?

Retinacula character: S

Hoya ferrerasii Kloppenburg & Siar 2010



Enlarged about
119x.

Pollinium:

length 0.39 mm
widest 0.18 mm

Retinaculum:

length 0.18 mm
shoulder 0.10 mm
waist 0.06 mm
hip 0.08 mm
ext. 0.02 mm

Translator:

length 0.10 mm
depth 0.08 mm

Caudicle:

bulb diam. 0.05 mm

Type: C

Translator

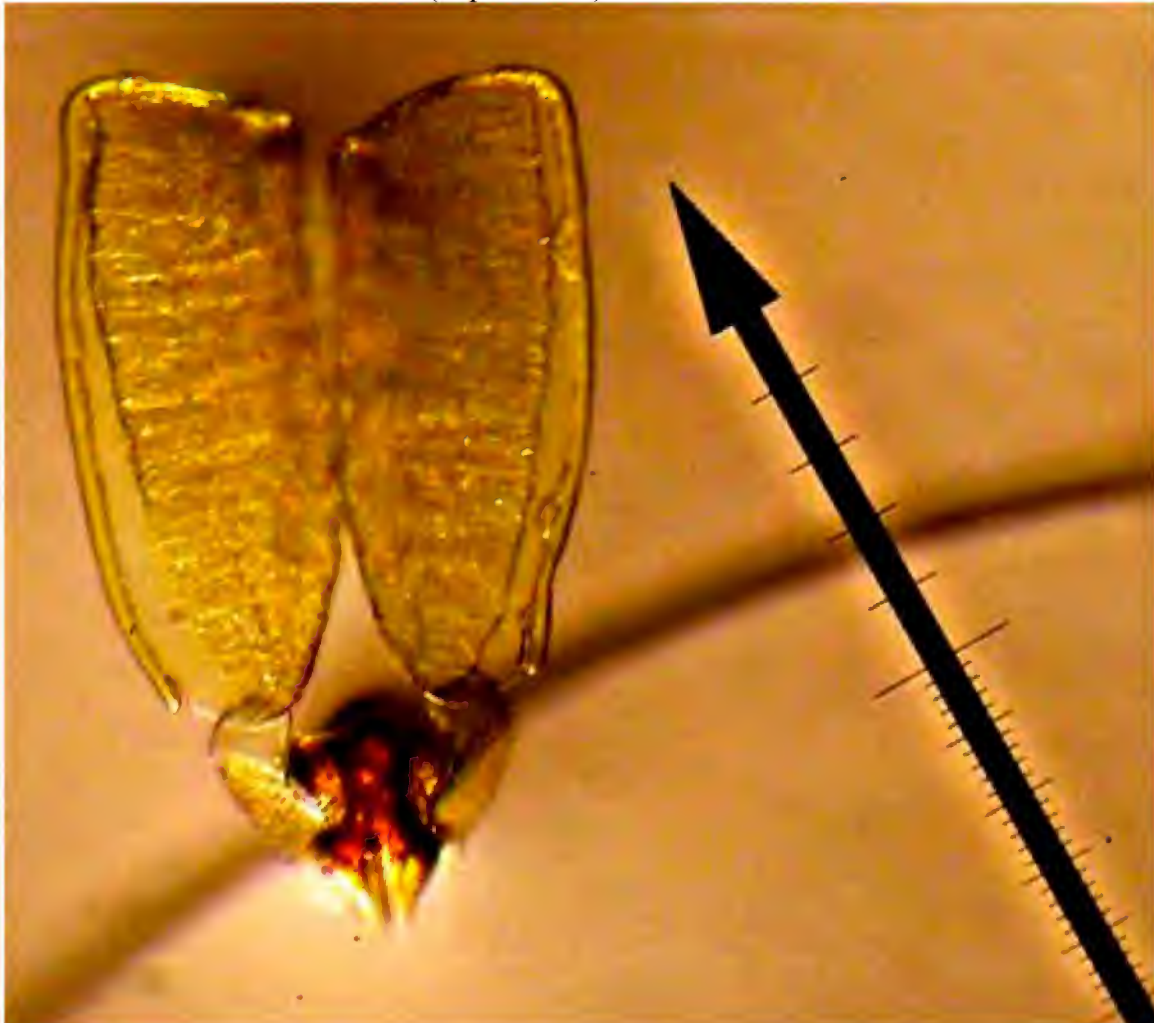
caudicle type: d/o

Pollinia apex type: T

Retinacula character: LS

Translators delta shaped.

Hoya tagumpayensis Kloppenburg & Mendoza
(unpublished) GM #154



Pollinarium enlarged 200x.

Pollinium

length 0.39 mm
widest 0.17 mm

Translator

length 0.09 mm
widest 0.05 mm

Retinaculum

length 0.09 mm from head to crotch
shoulder 0.12 mm
waist 0.05 mm
hip 0.11 mm
ext. 0.05 mm

Retinacula character: S

Translator/caudicle type: d/o

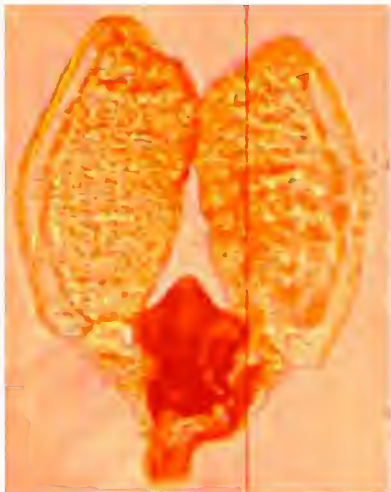
Caudicle

bulb diam 0.05 mm

Pollinia apex type: F

Caudicle bulb: C

Hoya blashernaezii subsp. siariae Kloppeburg 2014



Pollinarium enlarged, the arrow in the lower right is 1 mm long and with a base of 1/2 mm The pellucid edge runs from the outer apex all the way down the outside. The Pollinia are broad and short, translators are short and caudicles small. The retinaculum is relatively large, with broad shoulders and waist areas.

Pollinia

length	0.39 mm
widest	0.29 mm

Retinaculum

length	0.15 mm
shoulder	0.14 mm
waist	0.06 mm
hips	0.10 mm
extensions	0.03 mm

Translators

length	0.15 mm
depth	0.04 mm

Caudicle bulb.

diameter	0.06 mm
----------	---------

Type: G

Translator/caudicle type: d/o

Pollinia apex type: T

Retinacula character: S

Hoya kamgongensis Kloppenburg & Mendoza
(unpublished) GM #136



Pollinarium
enlarged ca. 130x.

Pollinium

length 0.39 mm
widest 0.19 mm

Retinaculum

length 0.15 mm
shoulder 0.12 mm
waist 0.06 mm
hip 0.08 mm
ext. 0.03 mm

Translator

length 0.08 mm
wide 0.05 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle type:
d/o

Pollinia inner apex type:
R

Caudicle bulb: C

Retinacula character: S

Note here the extremely fine pollen in the pollinia also that the pellucid edges

to not extend a long way toward the outer end of the pollinium toward the retinacular area.

Hoya blashernaezii subsp. vadacorolla Kloppenburg & Mendoza
(unpublished) GM #137



Pollinarium enlarged ca.
170x.

Pollinium

length 0.38 mm
widest 0.20 mm

Retinaculum

length 0.16 mm
shoulder 0.14 mm
waist 0.07 mm
hip 0.10 mm
ext. 0.02 mm

Translator

length 0.10 mm
widest 0.05 mm

Caudicle

bulb diam. 0.10 mm

Translator/caudicle type:
d/o

Pollinia inner apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya eburna subsp. infantaensis Kloppenburg & Mendoza
(unpublished) GM #24



Pollinarium enlarged
ca. 170x.

Pollinium

length 0.38 mm
widest 0.15 mm

Retinaculum

length 0.12 mm
shoulder 0.12 mm
waist 0.08 mm
hip 0.07 mm
ext. 0.06 mm

Translator

length 0.11 mm
depth 0.04 mm

Caudicle

Bulb diam. 0.05 mm

Translator/caudicle
type d/o

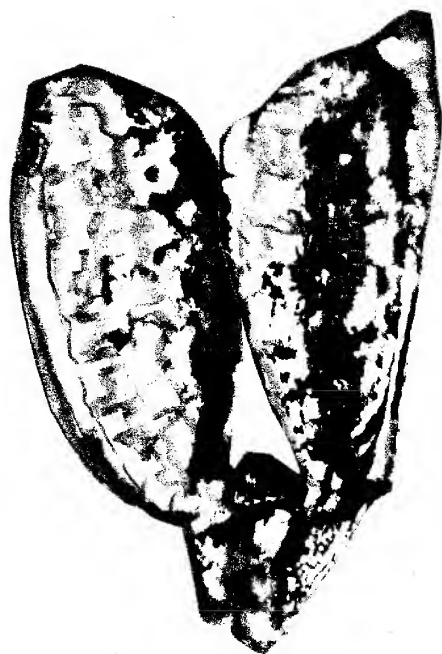
Pollinia end type: R

Caudicle bulb: G

Retinacula
character: HU

Hoya sp. CAHUP 5269

M. Wayet 1989 Baguio Village, Diffuin, Qurino, Luzon, Philippines
Fl. white or pale yellow, pubescent recurved corolla.



Magnified approximately 165x.

Pollinium

length: 0.38 mm
widest: 0.15 mm

Retinaculum

length: 0.11 mm
shoulder: 0.07 mm
waist: 0.04 mm
hip:
ext.:

Translators

length: 0.08 mm
depth: 0.01 mm

Caudicle

bulb. diam.: 0.04 mm

Translator/caudicle type d/o

Pollinia end type: RF

Caudicle bulb: ?

Retinacula type: S

Hoya sulu-anensis Kloppenburg & Mendoza
(unpublished) GM #189



Pollinarium enlarged 210x.

Pollinium

length	0.38 mm
widest	0.16 mm

Retinaculum

length	0.17 mm
shoulder	0.09 mm
#2 shoulder	0.09 mm
waist	0.04 mm
hip	0.08 mm
ext.	0.04 mm

Translator

length	0.09 mm
wide	0.04 mm

Caudicle

bulb diam.	0.04 mm
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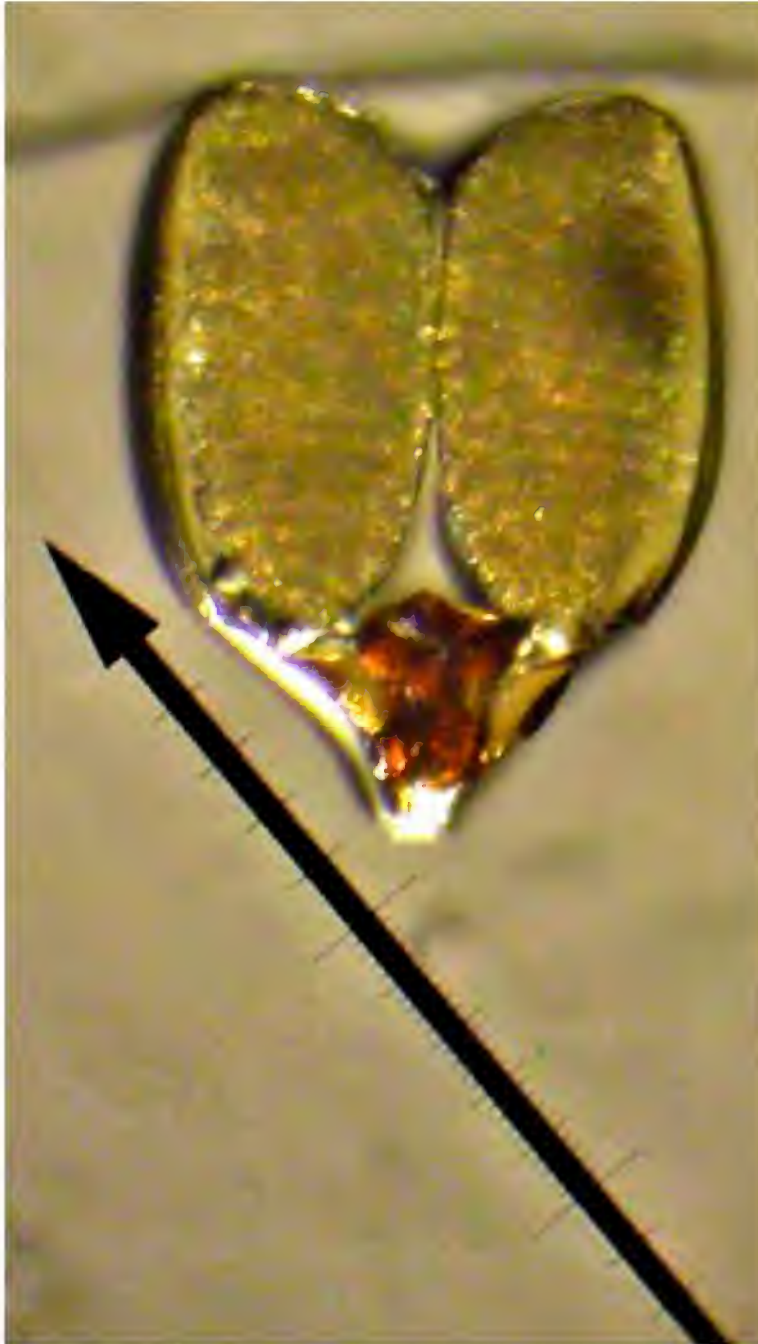
Translator/caudicle type:
d/o

Pollinia inner apex type:
RT

Caudicle bulb: C

Retinacula character: 2S

Hoya blashernaezii subsp. mendozai Kloppenburg
(unpublished) GM #147



Pollinarium enlarged
180x.

Pollinium

length 0.37 mm
widest 0.22 mm

Retinaculum

length 0.13 mm
shoulder 0.13 mm
waist 0.06 mm
hip 0.09 mm
ext. 0.03 mm

Translator

length 0.10 mm
depth 0.04 mm

Caudicle

bulb diam. 0.05 mm

Translator/caudicle

type: d/o

Pollinia inner apex

type: R

Caudicle bulb: ?

Retinacula character: S

Hoya lambioae Kloppenburg, Guevarra, Cajano, & Carandang 2015



Pollinarium
enlarged ca. 220x.

Pollinium

length 0.37 mm
widest 0.15 mm

Retinaculum

length 0.10 mm
shoulder 0.10 mm
waist 0.04 mm
hip 0.07 mm
ext. 0.05 mm

Translator

length 0.07 mm
width 0.02 mm

Caudicle

bulb diam. 0.05 mm

Type: C

Translator type:

ls/o or d/o

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: S

Hoya blashernaezii subsp. armerina Kloppenburg & Mendoza
(unpublished) GM #7



Pollinarium
enlarged ca. 152x

Pollinium

length 0.37 mm
widest 0.19 mm

Retinaculum

length 0.16 mm
shoulder 0.14 mm
waist 0.07 mm
hip 0.09 mm
ext. 0.05 mm

Translator

length 0.10 mm
depth 0.05 mm

Caudicle

bulb diam. 0.04 mm

**Retinacula
character: S**

Translator/caudicle type: d/o

Ratio: p/w 1.9

p/r 2.3

Pollinia apex type: R

Caudicle bulb: G

Retinacula type: S

Hoya sp. IPPS 8860

Umbels via Torill Nyhuus march 2007, data 3/28/07



Pollinaria enlarged about 65x.

Pollinium

length	0.37 mm
widest	0.13 mm

Translators

length	0.09 mm
widest	0.03 mm
depth	0.01 mm

Retinacula

length	0.10 mm
shoulder	0.09 mm
waist	0.05 mm
hip	0.06 mm

Caudicle

bulb diam.	0.04 mm
------------	---------

Retinacula character: S

Translator/caudicle type: d/o

ext.

0.05 mm

Pollinia apex type: R

Caudicle bulb: G

Hoya tomataensis Green and Kloppenburg 2004



Pollinarium enlarged about 165x. The caudicles with a digital microscope show up as clear yellow globs above the translator arms.



Pollinia

length 0.37 mm

Widest 0.16 mm

Retinaculum

length 0.08 mm

shoulders 0.09 mm

Waist 0.06 mm

Hips 0.08 mm

ext. 0.04 mm

Translators

length 0.05 mm

depth 0.03 mm

Caudicle bulb diam. 0.04 mm

Translator/caudicle type: d/o

Pollinia apex type: R

Caudicle bulb: C

Retinacula character: S

Hoya blashernaezii subsp. kamagongensis Kloppenburg &
Mendoza
(unpublished) GM #163



Pollinarium enlarged 190x.

Pollinium

length	0.36 mm
widest	0.20 mm

Retinaculum

length	0.13 mm
shoulder	0.13 mm
waist	0.06 mm
hip	0.10 mm
ext.	0.04 mm

Translator

length	0.11 mm
widest	0.04 mm

Caudicle

bulb diam.	0.07 mm
------------	---------

Translator/caudicle type:
d/o

Pollinia apex type: R

Caudicle bulb: C

The retinacular length is measured from head to the crotch (ext.) and does not include the extension length, overall length would be from head apex to end of extensions or here 0.7 mm.

Retinacula character: S

Hoya blashernaezii subsp. nagcarlanensis Kloppenburg &
Mendoza
(unpublished) GM #86



Pollinarium enlarged ca.
140x.

Pollinium

length	0.36 mm
widest	0.20 mm

Retinaculum

length	0.10 mm
shoulder	0.14 mm
waist	0.05 mm
hip	0.10 mm
ext.	0.06 mm

Translator

length	0.13 mm
widest	0.04 mm

Caudicle

bulb diam.	0.07 mm
------------	---------

Translator/caudicle type:
d/o

Pollinia end type: T

Caudicle bulb: G

Retinacula character: S

Hoya blashernaezii subsp. parviora Kloppenburg & Mendoza



Pollinarium enlarged ca. 140x.

Pollinium

length	0.36 mm
widest	0.21 mm

Translator

length	0.05 mm
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Retinaculum

length	0.15 mm
shoulder	0.15 mm
waist	0.11 mm
hip	0.14 mm

Caudicle

bulb diam.	0.06 mm
------------	---------

Translator/caudicle Type: ls/o ?

Pollinia apex type: RT

Hoya blashernaezii subsp. simeonae Kloppenburg & Mendoza
(unpublished) GM #182



Pollinium enlarged 230x

Pollinium

length 0.35 mm
Widest 0.20 mm

Translator

Retinaculum

length 0.14 mm
shoulder 0.14 mm
waist 0.06 mm
hip 0.10 mm
ext. 0.04 mm

length 0.11 mm
widest 0.04 mm

Caudicle
bulb. oval 0.06 x 0.04 mm

Translator/caudicle type: d/o

Pollinia apex type: F

Caudicle bulb: C

Retinacula character: S

Hoya polystachya alba

via Ted Green , Kaaawa Hawaii

Grown and flowered in Hawaii



Pollinarium enlarged about 165x.

Pollinia

length	0.35 mm
widest	0.19 mm

Retinaculum

length	0.18 mm
shoulder	0.11 mm
waist	0.05 mm
hip	0.06 mm
ext.	0.03 mm

Translators

length	0.09 mm
depth	0.04 mm

Caudicle bulb

diameter	0.04 mm
----------	---------

Translator/caudicle type: d/o

Pollinia apex type: RF

Caudicle bulb: G

Retinacula character: S



Pollinarium enlarged about 165x. Another flowering of same clone

Pollinia

length	0.35 mm
widest	0.19 mm

Retinaculum

length	0.18 mm
shoulder	0.11 mm
waist	0.05 mm
hip.	0.06 mm
ext.	0.04 mm

Translators

length	0.09 mm
widest	0.04 mm

Caudicle

bulb diam. 0.03 mm

Hoya salmonea Kloppenburg, Guevarra, Mendoza & Ferreras

holotypus 14622 (PUH) ISSN 2329-7336 2013



Pollinaria (2) enlarged ca. 150x.

Pollinium:

length 0.35 mm
widest 0.14 mm

Translator:

length 0.09 mm
widest 0.04 mm

Retinaculum:

length 0.10 mm
shoulder 0.10 mm
waist 0.04 mm

Caudicle

bulb diam 0.04 mm

Type: G

Translator/caudicle type: d/o

hip 0.07 mm
ext. 0.05 mm

Retinacula character: S

Pollinia apex type: T

Hoya salmonea subsp. pallida Kloppenburg, Mendoza & Ferreras
2013

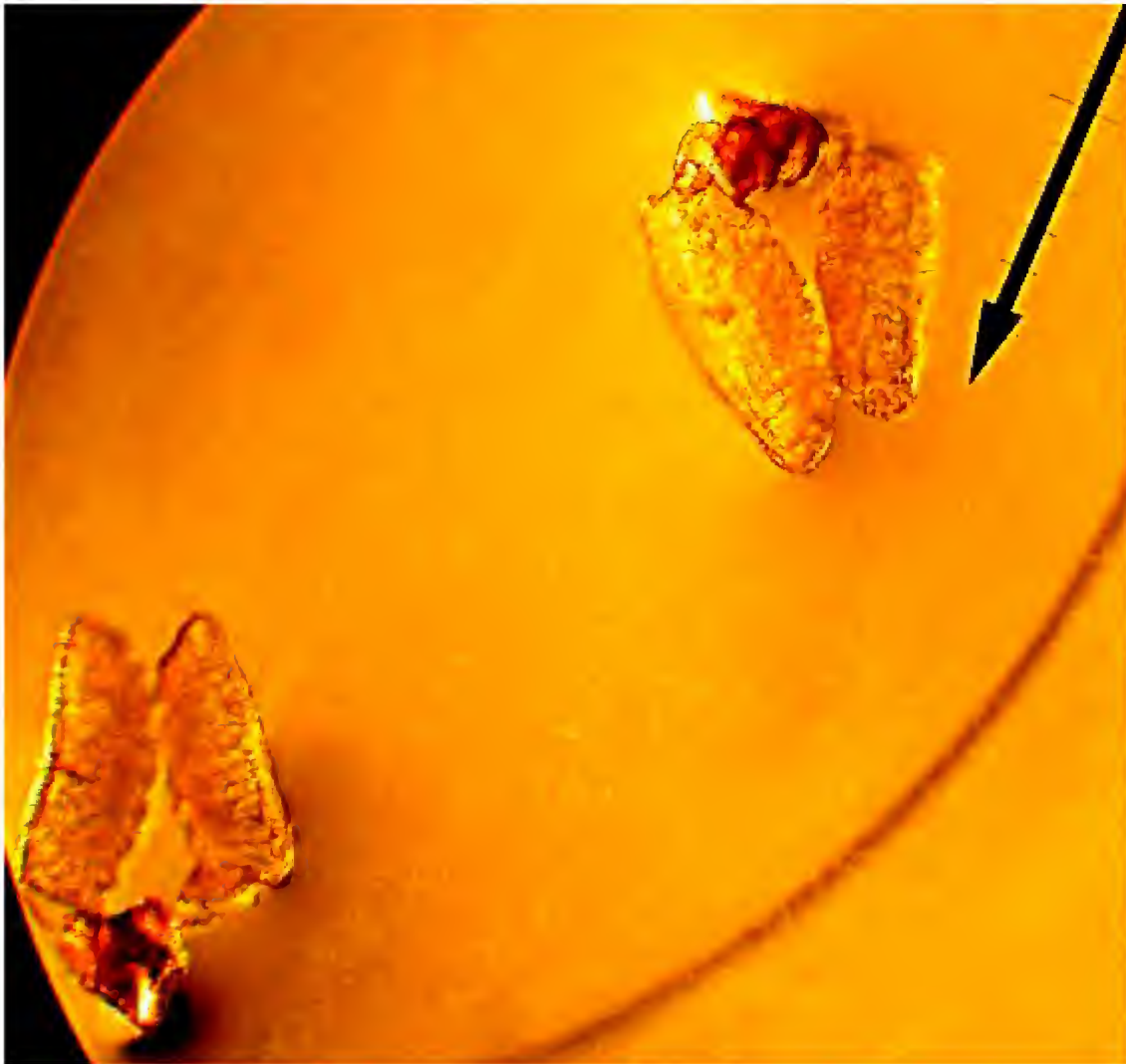


Photo above of two pollinaria enlarged ca. 110x.



Pollinia from several flowers all somewhat deformed, shriveled (the pollinia) the upper right one seems best for measurements.

Pollinium

length 0.35 mm
widest 0.17 mm

Retinaculum

length 0.10 mm

shoulders 0.15 mm

Translator

length 0.11 mm
widest 0.05 mm

waist 0.07 mm
hip 0.11 mm
ext. 0.08 mm

Caudicle

Translator/caudicle type: d/o

bulb diam. 0.05 mm

Pollinia apex type: T

Caudicle bulb type: G

Retinacula character: S

Hoya blashernaezii subsp. luzonensis Kloppenburg & Mendoza
(unpublished) GM #160



Pollinarium enlarged
90x.

Pollinium

length	0.34 mm
widest	0.22 mm

Caudicle

bulb diam.	0.06 mm
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Retinaculum

length	0.12 mm
shoulder	0.13 mm
waist	0.05 mm
hip	0.10 mm
ext.	0.08 mm

Translator/caudicle type: d/o

Pollinia apex type: T

Caudicle bulb: C

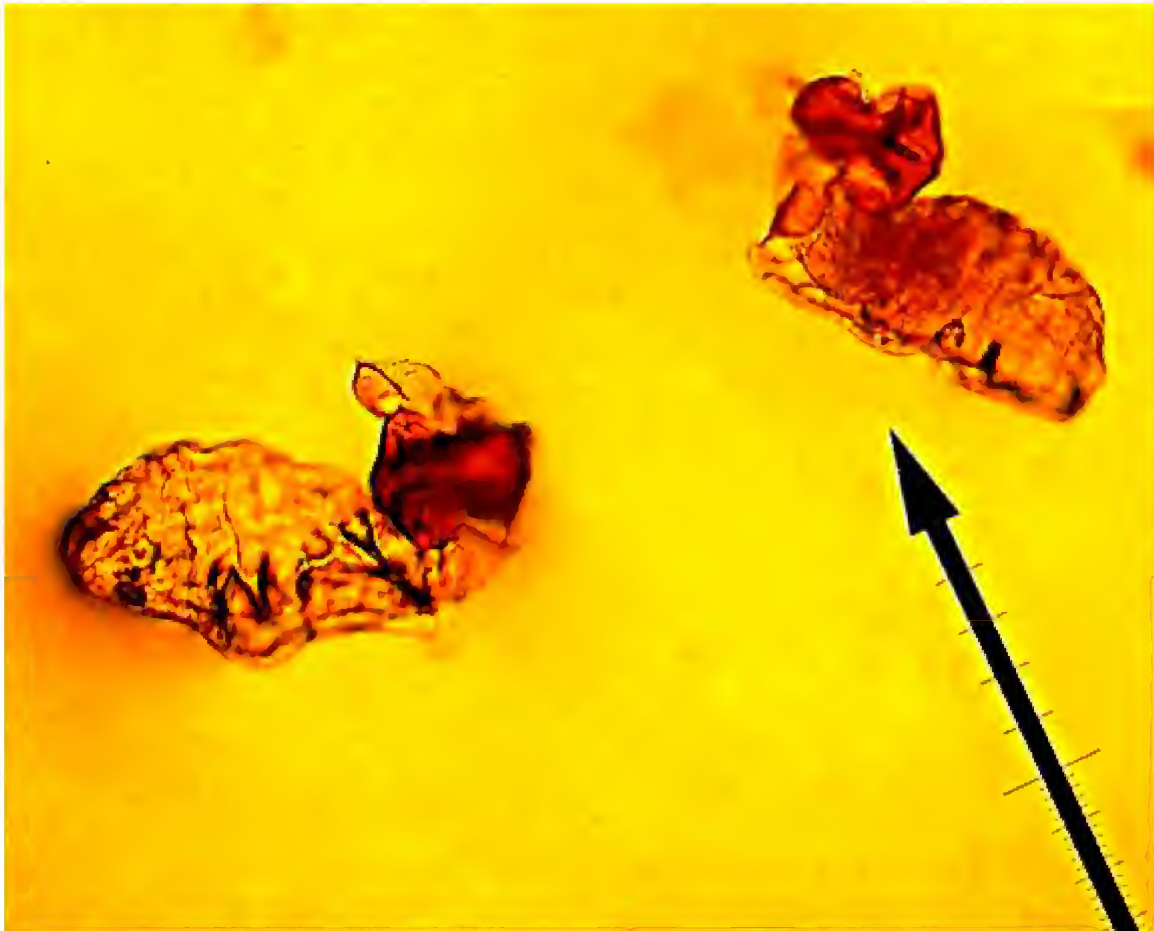
Retinacula character: S

Translator

length 0.12 mm
widest 0.04 mm

Hoya blashernaezii subsp. rosea Kloppenburg

AC #5
(unpublished)



Pollinarium enlarged ca. 140x.

Pollinium

length 0.32 mm
widest 0.15 mm

Translator/caudicle type: d/o

Pollinia inner end type: R

Retinaculum

length 0.15 mm
shoulder 0.10 mm
waist 0.05 mm
hip 0.08 mm
ext. nil or possibly 0.1 mm

Caudicle bulb: ?

Retinacula character: S

Translator

Caudicle

length 0.10 mm
wide 0.04 mm

bulb diam. 0.05 mm

Hoya bifunda subsp. obtusa Kloppenburg & Mendoza
(unpublished) GM #12



Pollinarium
enlarged ca. 250x.

Pollinium

length 0.29 mm
widest 0.13 cm

Retinaculum

length 0.06 mm
shoulder 0.08 mm
waist 0.06 mm
hip 0.05 mm
ext. 0.04 mm

Translator

length 0.07 mm
depth 0.02 mm

Caudicle

bulb diam. 0.04 mm

**Translator/
Caudicle**

type: closest to d/o

Ratios: p/w 2.2
p/r 3.6

Pollinia end type:
R

Caudicle bulb: G

Retinacula character: LS

Hoya nakarensis Kloppenburg, Mendoza & Ferreras 2013
ISSN 1055-4564



Pollinarium enlarged ca.
250x.

Pollinium

length	0.26 mm
widest	0.13 mm

Retinaculum

length	0.06 mm
shoulder	0.09 mm
waist	0.03 mm
hip	0.06 mm
ext.	0.03 mm

Translator

length	0.05 mm
widest	0.02 mm

Caudicle

bulb diam.	0.03 mm
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Type: C

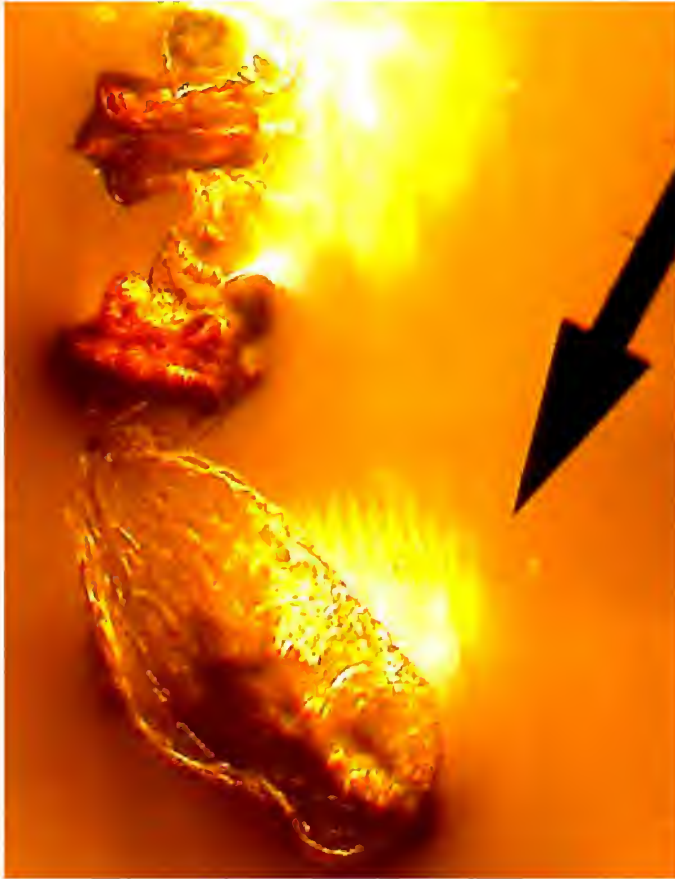
Translator/caudicle type:
d/o

Pollinia inner end type: R

Caudicle bulb: C ?

Retinacula character: HU

Hoya albida Kloppenburg, Cajano, Guevarra & Carandang 2013
Type clone



Two retinacula with translators and one pollinium enlarged ca. 330x.

Pollinium

length	0.25 mm
widest	0.09 mm

Retinaculum

length	0.10 mm
shoulder	0.08 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.02 mm

Translator

length	0.05 mm
depth	0.02 mm

Ratios: p/r 2.5 p/w 2.8

Translator /caudicle type: d/o

Pollinia end type: R

Caudicle bulb: ?

Retinacula character: S

Hoya maubanensis Kloppenburg & Mendoza
(unpublished) GM #66



Pollinaria enlarged ca. 190x.

Pollinium

length	0.25 mm
widest	0.13 mm

Translator

length	0.06 mm
widest	0.02 mm

Retinaculum

length	0.08 mm
shoulder	0.09 mm
waist	0.05 mm

Caudicle

bulb diam.	0.04 mm
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Retinacula character: S

Translator/caudicle type: d/o

hip	0.06 mm	Pollinia end type: R
ext.	0.02 mm	Caudicle bulb: ?

Hoya williamsiana Kloppenburg, Siar, Mendoza, Cajano, Guevarra
& Carandang 2013



Pollinarium enlarged ca. 450x.

Pollinium

length	0.20 mm
widest	0.10 mm

Ratios: p/r 2.9 p/w 2.0

Translator/caudicle type: d/o

Retinaculum

length	0.07 mm
shoulder	0.08 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.03 mm

Caudicle

bulb diam.	0.02 mm
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Translator

length	0.05 mm
depth	0.02 mm

Translator/caudicle type: d/o

Pollinia ends: T

Caudicle bulb: C

Retinacula character: S

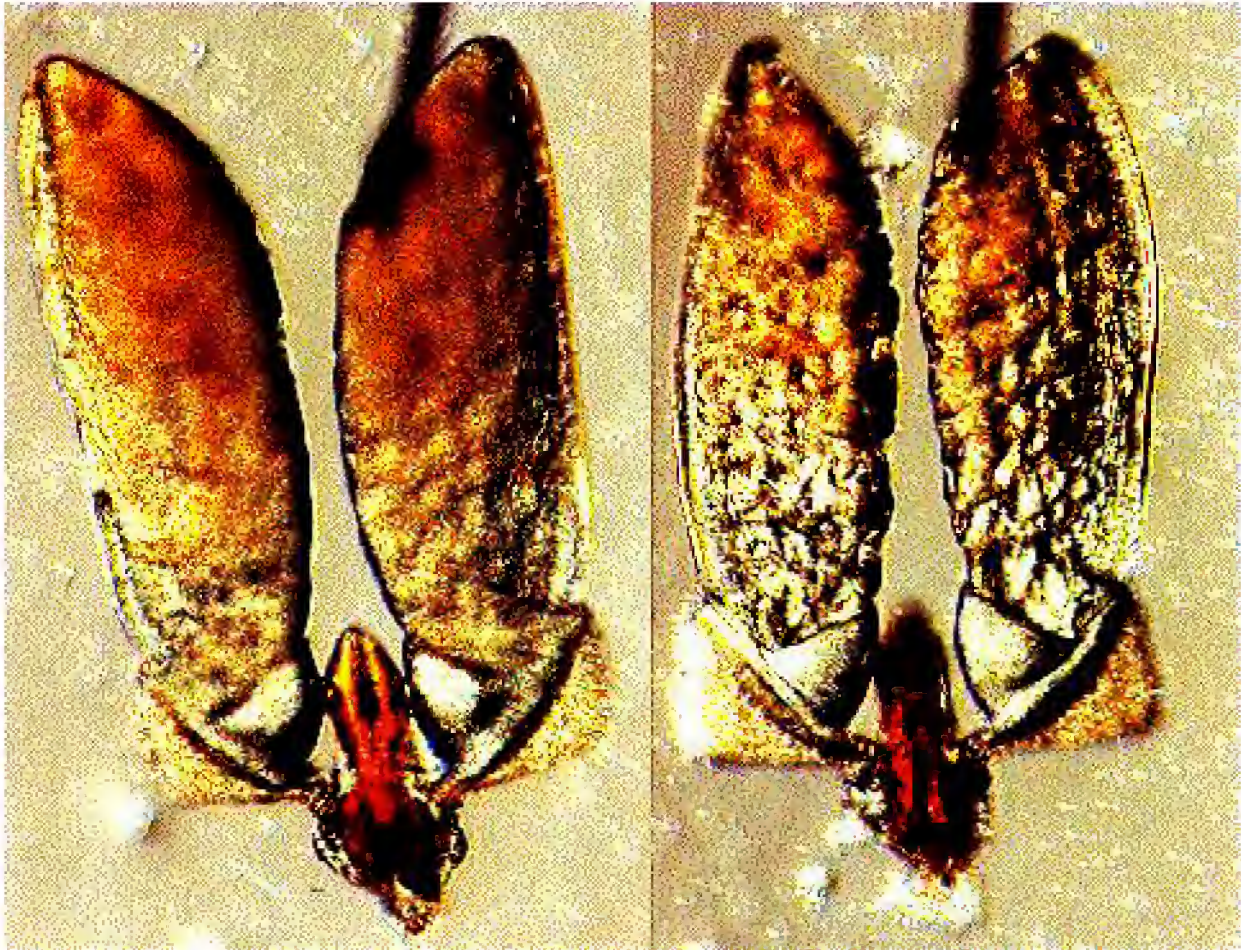
Pollinia Types 2017-5

t/o or t/cw

1. **Hoya plicata** King & Gamble 1908
2. **Hoya sp.** Tioman Island, Malaysia Ted Green
3. **Hoya kanyakumariana** Henry 1978
4. **Hoya sp.** NH #1 (Vanuatu)
5. **Hoya penta** Kloppenburg & Mendoza
6. **Hoya kastbergii** Kloppenburg 2003
7. **Hoya imbricata** Decaisne 1844 (mottled lf form)
8. **Hoya indentata** Kloppenburg & Mendoza
9. **Hoya loheri subsp. tanawanensis** Kloppenburg & Mendoza 2015
10. **Hoya acanthotruncata** Kloppenburg & Mendoza
11. **Hoya tingkoyanensis** Kloppenburg & Mendoza 2015

***Hoya plicata* King & Gamble 1908**

Pollinarium from clone #81036 collected at Ula Kali, Malaysia.



Two pollinaria at different focal lengths, namely to show the detail of the translators and caudicles, here enlarged about 165x. The pollinia are long, truncated at the apex, and with a narrow vacuole inside form the pellucid margin. The retinaculum is long especially the head area with a broad hip area. The most outstanding feature here is the exceptionally well differentiated caudicle which envelope the whole attached end of the pollinia and nearly block it from view with their fine granular or stippled surface (most all caudicles in hoyas are clear. Note also the actual structured quality of the caudicle especial discernable on the left hand Pollinarium. The translators as usual are wedge shaped the broader portion supporting this complex caudicle.

Pollinarium:

Pollinium

length:	0.55 mm
widest:	0.19 mm

Retinaculum

length:	0.20 mm
shoulder:	0.07 mm
waist	0.05 mm
hip:	0.08 mm
extensions	0.05 mm

Translators

length:	0.19 mm
depth:	0.10 mm

Caudicle

bulb diam.	0.10 mm
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Translator/caudicle type: t/cw

Pollinia apex type: T

Caudicle bulb: G

Retinacula character: E

Hoya sp. Tioman Island, Malaysia Ted Green
Hoya plicata ?



Pollinium

length	0.55 mm
widest	0.18 mm

Retinaculum

length	0.17 mm
shoulders	0.08 mm
waist	0.04 mm
hip	0.09 mm
ext.	0.05 mm

Translators

length	0.22 mm
widest	0.07 mm
top depth	0.03 mm

Caudicle

bulb diam.	0.11 mm
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Translator/caudicle type: t/cw

Pollinia apex type: RT

Caudicle bulb: C

Retinacula character: E

Hoya kanyakumariana Henry 1978

from flowers at Ted Green's October 2003



Pollinarium enlarged about 165x.
Pollinia inner apices truncate inwardly.
Translators are delta shaped enlarged with rounded outer apices, surface somewhat granulose.

Pollinium

length	0.46 mm
widest	0.16 mm

Retinaculum

length	0.11 mm
shoulder	0.06 mm
waist	0.05 mm
hips	0.08 mm
extensions	0.02 mm

Caudicle

bulb diam	0.05 mm
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Translator Type: t/cw

Pollinia inner end type: F

Caudicle bulb: C

Retinacula character: S

Hoya sp. NH #1 (Vanuatu).

Flower from Ann Wayman

Magnified approximately 165x.



Pollinium

length: 0.45 mm
widest: 0.17 mm

Retinaculum

length: 0.12 mm
shoulder: 0.12 mm
waist: 0.06 mm
hip: 0.10 mm
ext.: 0.08 mm

Translators

length: 0.02 mm
depth: 0.06 mm

Caudicle

bulb diam: 0.07 mm

Translator caudicle type: t/cw

Pollinia inner end type: F

Caudicle bulb: G

Retinacula character: S ?

Hoya penta Kloppenburg & Mendoza
(unpublished) GM #55



Pollinarium above enlarged ca. 120x

Pollinium

length	0.44 mm
widest	0.15 mm

Translator/caudicle type: tp/cw

Retinaculum

length	0.10 mm
shoulder	0.06 mm
waist	0.05 mm
hip	0.07 mm
ext	0.02 mm

Pollinia end type: T

Retinacula type: S

Translator

Length	0.17 mm
Widest	0.10 mm

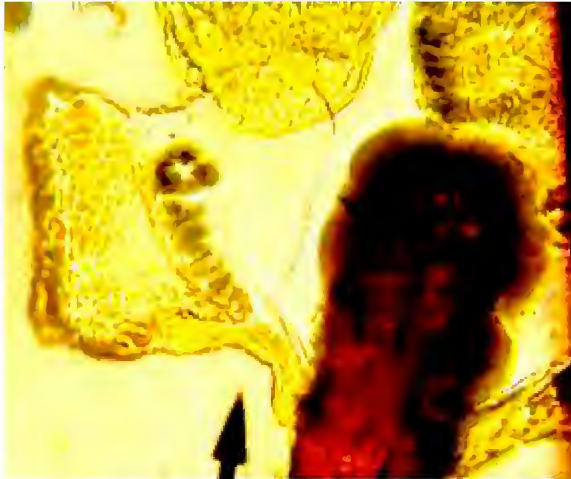
Caudicle

bulb top	0.10 mm
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Caudicle bulb: G

Hoya kastbergii Kloppenburg 2003

Type material 203003 (UC)



Magnified over 400x is the translator caudicle area of the pollinarium showing how the darker (more structured) translator arm supports the clear caudicle; both narrow greatly as they enter the retinaculum, where they are attached internally. The translators and bulbous clear pollywog like caudicles enter the retinaculum at the hip area. The translators support the caudicle, which in turn adheres to the pollinium. The bi-symmetrical nature of the retinaculum is due to secretions from a split in the top of the stigmatic surface.



A distinctive pollinarium, with delta winged translator arms.

Pollinia

length	0.44 mm
widest	0.18 mm

Retinaculum

length	0.17 mm
head	0.07 mm
waist	0.04 mm
hip	0.06 mm
extensions	0.06 mm

Translators are delta wing shaped from

ret - lower end	0.12 mm
outer edge	0.10 mm

Caudicle

bulb	0.07 mm
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Translator/caudicle type: t/cw

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: E

***Hoya imbricata* Decaisne 1844**

Flower from Ted Green, Hawaii
Mottled leaf clone from Palawan, Philippines.



Magnified approximately 165x.

Pollinium

length: 0.43 mm
widest: 0.16 mm

Retinaculum

length: 0.13 mm
shoulder: 0.07 mm
waist: 0.05 mm
hip: 0.07 mm
ext.: 0.03 mm.

Translators

length: 0.22 mm
depth: variable

Caudicle

bulb diam.: 0.07 mm

Translator/caudicle type: t/o

Pollinia inner end type: R

Caudicle bulb: ?

Retinacula character: R

Hoya indentata Kloppenburg & Mendoza
(unpublished) GM #91



Pollinarium enlarged ca.
120x.

Pollinia

length	0.40 mm
widest	0.12 mm

Retinaculum

length	0.10 mm
shoulder	0.08 mm
waist	0.05 mm
hip	0.07 mm
ext.	0.05 mm

Translator is truncate type

basal length	0.10 mm
vertical rise	0.12 mm
stem	0.02 mm

Caudicle

bulb diam.	0.08 mm
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Translator/caudicle type:
tb/cw

Pollinia end type: RT

Caudicle bulb: ?

Hoya loheri subsp. tanawanensis Kloppenburg & Mendoza 2015
GM #131



Pollinaria parts enlarged 140x. I was unable to obtain an intact pollinaria even from 6 flowers.

Pollinia

length 0.30 mm
widest 0.15 mm

Retinaculum

length 0.07 mm
overall 0.12 mm
shoulder 0.05 mm
waist 0.04 mm
hip 0.05 mm
ext. 0.05 mm

Translator

length 0.14 mm
base shelf 0.06 mm

Caudicle

bulb. 0.12 x 0.05 mm

Pollinia inner end type:
T (tapered)

Retinacula type: HU
(hands up)

Translator/caudicle type: modified: T (truncate), here outer edge elongated upward culminating in a narrow apical area. t/o

Hoya acanthotruncata Kloppenburg & Mendoza
(unpublished) GM #42



Pollinarium above enlarged ca. 220x. The truncated translator is very rare in Hoya species, so far in the Section Acanthostemma I have only found it in *Hoya plicata* King & Gamble, this is the first species in this section from the Philippines with this character.

Pollinium

length	0.23 mm
widest	0.13 mm

Retinaculum

length	0.06 mm
shoulder	0.06 mm
waist	0.04 mm
hip	0.05 mm
ext.	0.04 mm

length measured always from head to crotch
excludes the extensions.

Retinacula character: S

Translator

length out	0.08 mm
length up	0.06 mm

Translator/caudicle type: t/cw

Caudicle

widest top	0.06 mm
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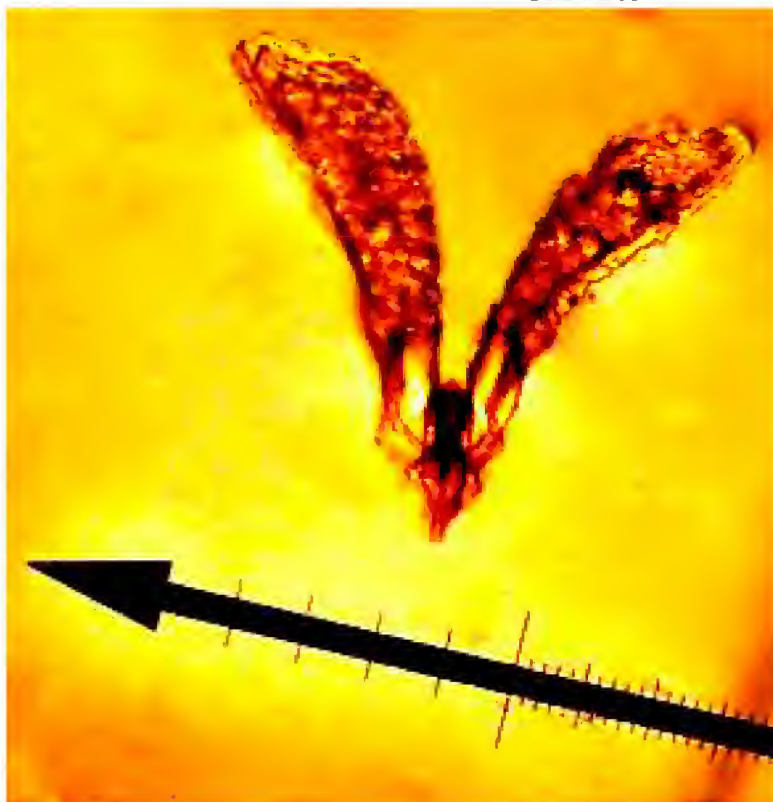
Pollinia inner end type: T

Type: C

from outer apex to retinacula 0.08 mm

Hoya tingkoyanensis Kloppenburg & Mendoza 2015

GM #203



Pollinarium enlarged about 190x.

Pollinium

length 0.18 mm
widest 0.10 mm

Retinacula

length 0.10 mm
shoulder 0.04 mm
waist 0.02 mm
hip 0.04 mm
ext. 0.02 mm

Translator

length 0.12 mm
widest 0.02 mm

Caudicle

bulb 0.10 x 0.04 mm

The caudicle bulbs are the most unusual I have observed, oval and long and clear, also the translators are unusual. As yet unclassified.



An enlargement to show the unusual translator shape and the elongated caudicle bulbs.

Pollinia inner end type: T (tapered)

Retinaculum type: elongated “E”, here the hips are broader than the shoulders, another unusual occurrence.

Translator/caudicle type: as yet unclassified.

Pollinia Types 2017-6

ls/cw or lb/cw

1. **Hoya cf. coriacea** Toba TG
2. **Hoya cf. halconensis** Kloppenburg 1990 NS 05-213
3. **Hoya cf. halconensis** Kloppenburg 1990 NS 05-225
4. **Hoya sp. Mt. Halcon, Philippines** 1990 NS05-231
5. **Hoya sp. NS05-231 Mt. Halcon, Philippines**
6. **Hoya sp. MT 13**
7. **Hoya darwinii ssp. minora** Kloppenburg & Mendoza
8. **Hoya sp. 577**
9. **Hoya williamoliveriana** Kloppenburg, Cajano & Hadsall 2015
10. **Hoya obtusata** Kloppenburg & Mendoza
11. **Hoya aurea subsp. nagcarlanensis** Kloppenburg & Mendoza
12. **Hoya barbonii** Kloppenburg 2014

Hoya cf. coriacea Toba TG



Pollinarium enlarged ca. 110x.

Pollinium

length 0.90 mm
widest 0.34 mm

Retinaculum

length 0.31 mm
shoulder 0.15 mm
waist 0.09 mm
hip 0.13 mm
extensions 0.09 mm

Translator

length 0.42 mm
wide 0.04 mm

Caudicle

dorsal 0.18 mm
length 0.30 mm

Translator /caudicle type:
ls/cw

Pollinia inner end type:
RT

Caudicle bulb: granulate

Retinacula character: R

Retinacular head long and narrow, shoulder area well down, hips with rounded surfaces. Length measurements are made from inner apex to the crotch and do not include the extensions.

Hoya cf. halconensis Kloppenburg 1990

Hoya sp. NS05-213



Pollinarium
enlarged. Scale
arrow length 0.10
mm long small
marks on shaft 0.01
mm long.

Pollinarium:

length	0.89 mm long.
widest	0.26 mm

Retinaculum

length	0.34 mm
shoulder	0.14 mm
waist	0.05 mm
hip	0.09 mm

Translators

length	0.40 mm
width	0.02 mm

Translator/caudicle type: l/cw

Pollinia inner end type: T

Caudicle bulb diam. 0.18 mm

Caudicle bulb: clear

Retinacula character: HE

Hoya cf. halconensis Kloppenburg 1990

Hoya sp. NS05-225 Flowers given to me in IRI UPLB by Dr. Monina Siar 2006

This is the same sp. as NS05-213



Pollinarium enlarged about 165x. Reticle arrow is 0.10 mm long and head 0.05 mm wide, marks on the stem 0.05 mm long.

Pollinium

length 0.88 mm
widest 0.25 mm

Retinaculum

length 0.30 mm
head 0.14 mm
shoulder 0.15 mm
waist 0.09 mm
hip 0.10 mm
ext. 0.04 mm

Translators

length 0.30 mm
depth 0.02 mm

Caudicle

Cw 0.18 mm top

Translator/caudicle
type: l/cw

Pollinia inner end
type: T

Caudicle bulb: granulate

Retinacula character: R

Hoya sp. NS05-231 Mt. Halcyon, Philippines

via Torill Nyhuus march 2007



Pollinarium enlarged about 165x. The retinaculum is turned edgewise but appears to have a long head area translator and caudicle entering below the hip area. Translator is very narrow and caudicle bulb surface is cupped (structured). Pollinium is long, narrow and inner apex is rounded.

Pollinium

length	0.81 mm
widest	0.24 mm

Retinacula

length	0.38 mm
shoulders	0.30 mm
waist	0.14 mm
hip	0.18 mm
ext.	0.06 mm

Translator

length	0.33 mm
widest	0.01 mm

Caudicle

bulb diam.	0.15 mm
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Translator/caudicle type: l/cw

Pollinia inner end type: RT

Retinacula character: HE

Caudicle: G

Hoya sp. MT. 13

via May Tolentino, Manila. Philippines. 5 flowers in Solution from Torill Nyhuus
3/20/07



Pollinarium enlarged
about 165x.

Translator/caudicle type: ls/cw
Pollinium

length	0.76 mm
widest	0.27 mm

Pollinia end type: RT

Retinacula character: E

Caudicle bulb: G

Retinaculum

length	0.30 mm
shoulder	0.12 mm
waist	0.10 mm
hip	0.11 mm
ext.	0.01 mm

Translators

length	0.22 mm
depth	0.03 mm

Caudicle bulb diam. 0.16 mm

Hoya darwinii subsp. minora Kloppenburg & Mendoza



A rare caudicle type here is the stippled surface looks like a snake skin.

The pellucid edge is short difficult to see clearly here. One thing I noticed is the slight indentation in the rectinacular head.

Pollinarium above enlarged ca. 90x, below a second picture focused to show the spade like rectinacular extensions.

Pollinia apex type:
R



Pollinium

length	0.72 mm
widest	0.43 mm

Retinaculum

length	0.77 mm
widest	0.65 mm
narrowest	0.29 mm
extensions	0.38 cm

Translator

length	0.63 mm
widest	0.10 mm

Caudicle

bulb top	0.32 mm (G)
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Translator/caudicle type: l/cw

Hoya sp. 577

Flower from Ann Wayman Central Point, OR. USA.



Magnifies approximately 165x.

Pollinium

length: 0.55 mm

widest: 0.20 mm

Retinaculum

length: 0.16 mm

shoulder: 0.08 mm

waist: 0.05 mm

hip: 0.09 mm

ext.: 0.04 mm

Translators

length: 0.14 mm

depth: 0.05 mm

Caudicle

bulb. diam.: 0.09 mm

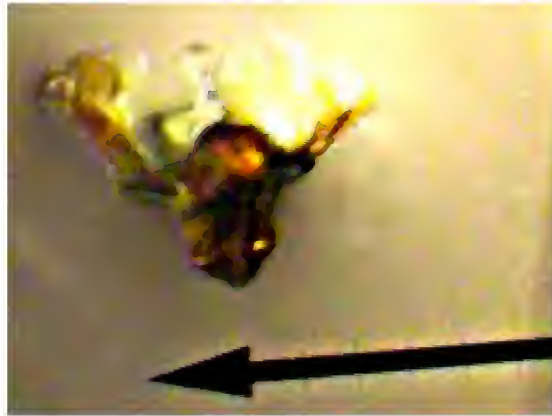
Translator/caudicle type: lb/cw

Pollinia apex type: T

Caudicle bulb: C

Retinacula character: S

Hoya williamoliveriana Kloppenburg, Cajano & Hadsall 2015



Both photos of the pollinarium enlarged near 140x.

Pollinium

length	0.48 mm
widest	0.20 mm

Retinaculum

length	0.13 mm
shoulder	0.10 mm
waist	0.06 mm
hip	0.08 mm
ext.	0.02 mm

Translator

length	0.15 mm
wide	0.02 mm

Caudicle

bulb diam;	0.06 mm
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Type: C (clear)

Translator/caudicle type: l/cw ? **Pollinia inner end type:** T **Retinacula type:** R

Hoya obtusata Kloppenburg & Mendoza
(unpublished) GM #26



Pollinarium
enlarged 180x

Pollinium:

length 0.45 mm
widest 0.14 mm

Retinaculum:

length 0.08 mm
shoulder 0.05 mm
waist 0.03 mm
hip 0.05 mm
ext. 0.03 mm

Translator:

length 0.19 mm
wide 0.06 mm

Caudicle:

bulb diam.0.07mm

Retinacula

character: R

Translator/caudicle type: lb/cw

Pollinia end type: T

Caudicle bulb: G

Hoya aurea subsp. nagcarlanensis Kloppenburg & Mendoza
(unpublished) GM #73



Pollinarium enlarged ca.
158x.

Pollinium

length 0.28 mm
widest 0.09 mm

Retinaculum

length 0.08 mm
shoulder 0.06 mm
waist 0.03 mm
hip 0.05 mm
ext. 0.03 mm

Translator

length 0.09 mm
widest 0.03 mm

Caudicle

bulb 0.05 x 0.06 mm

Translator/caudicle type:
lb/cw

Pollinia end type: R

Caudicle bulb: C

Retinacula character: S

Hoya barbonii Kloppenburg 2014

sp. PNH 2175

Collected by Barbon, Alvarez, Garcia at Sibulan, Sta Maria in watershed area 8/31/91 An Acanthostemma sp. The pollinarium is very close to Hoya obscure var. longipedunculata.



Pollinarium enlarged about 125x. Inner pollinia lobes are truncate, translators are long and narrow with clear caudicles visible.

Pollinium

length	0.28 mm
widest	0.11 mm

Retinaculum

length	0.13 mm
head	0.04 mm
hip	0.05 mm
ext.	0.02 mm

Translators

length	0.14 mm
widest	0.03 mm

Caudicle

bulb diam.	0.05 mm
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Type: C

Translator/caudicle **type:**
lb/cw

Pollinia end type: T

Caudicle bulb: C

Retinacula character: LS

Pollinia types 2017-7

ls/r or l/r

1. **Hoya mindorensis subsp. ehirsuta** Kloppenburg & Mendoza
2. **Hoya mindorensis subsp. superba** Kloppenburg 2005
3. **Hoya mindorensis** Schlechter 1906
4. **Hoya mindorensis subsp. cremea** Kloppenburg & Mendoza
5. **Hoya mindorensis subsp. horizontala** Kloppenburg, Guevarra & Carandang
6. **Hoya mindorensis subsp. kanagongensis** Kloppenburg & Mendoza
7. **Hoya mindorensis subsp. altransa** Kloppenburg, Guevarra & Carandang
8. **Hoya mindorensis subsp. waymaniana** Kloppenburg
9. **Hoya mindorensis subsp. duoa** Kloppenburg, Guevarra & Carandang
10. **Hoya erythrostemma** Kerr 1939
11. **Hoya mindorensis subsp. quezonensis** Kloppenburg & Mendoza
12. **Hoya mindorensis subsp. globosa** Kloppenburg, Guevarra & Carandang
13. **Hoya mindorensis subsp. tingkoyanensis** Kloppenburg & Mendoza GM #119
14. **Hoya mindorensis subsp. luzonensis** Kloppenburg & Mendoza
15. **Hoya mindorensis subsp. squama** Kloppenburg, Guevarra & Carandang
16. **Hoya mindorensis subsp. gelba** Kloppenburg & Mendoza
17. **Hoya mindorensis subsp. nagcarlanensis** Kloppenburg & Mendoza
18. W 9456 Savai'i
19. **Hoya mindorensis subsp. lalawinanensis** Kloppenburg & Mendoza
20. **Hoya mindorensis subsp. lagunaensis** Kloppenburg & Mendoza
21. **Hoya mindorensis subsp. nuevaensis** Kloppenburg & Mendoza
22. **Hoya mindorensis** Schlechter 1906
23. **Hoya mindorensis subsp. rosea** Kloppenburg & Mendoza
24. **Hoya mindorensis subsp. tacta** Kloppenburg, Guevarra & Carandang
25. **Hoya mindorensis subsp. mendozae** Kloppenburg & Ferreras 2015
26. **Hoya mindorensis subsp. condupla** Kloppenburg, Guevarra & Carandang
27. **Hoya mindorensis subsp. hirsuta** Kloppenburg, Guevarra & Carandang
28. **Hoya mindorensis subsp. bakerensis** Kloppenburg & Mendoza
29. **Hoya mindorensis subsp. mabilogensis** Kloppenburg & Mendoza
30. **Hoya mindorensis subsp. siniloanensis** Kloppenburg & Mendoza
31. **Hoya mindorensis subsp. granulata** Kloppenburg, Guevarra & Carandang
32. **Hoya mindorensis subsp. corollastriata** Kloppenburg, Mendoza & Cajano
33. **Hoya blashernaezii subsp. straminea** Kloppenburg & Mendoza
34. **Hoya spartioides** (Kuntz) Kloppenburg 2001

Hoya mindorensis subsp. ehirsuta Kloppenburg & Mendoza
(unpublished) GM #197



Pollinarium enlarged ca.
165x

Pollinium

length 0.87 mm
widest 0.28 mm

Retinaculum

length 0.23 mm
widest 0.27 mm
ext. 0.15 mm

Translator

length 0.20 mm
widest 0.04 mm

Caudicle

oval 0.15 x 0.06 mm

Translator caudicle type:
ls/r

Pollinia apex type: R

Caudicle bulb: granulate
G

Retinacula character:
HH/LN

With most of the subspecies in this group the legs of the retinaculum are rolled under the lower edge so difficult to delineate. Most have rounded heads but with 2 protrusions further back so

often hidden here both legs and dorsal modifications show. Here the caudicles show the granular surface (much like a dried snake skin). The supporting translators are dark with convex dorsal surfaces.

Hoya mindorensis subsp. superba Kloppenburg 2005



- Pollinarium enlarge about 65x.

Pollinia

length	0.68 mm
widest	0.30 mm

Retinaculum

nearly round	0.40 mm long
widest	0.44 mm
extensions	0.16 mm

Translators

length	0.18 mm
width	0.02 mm

Caudicle

bulb diam.	0.09 mm
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Photo to left is enlarged area of the translators and clear caudicle bulb attached from the dark round retinacula to the pollinium.

Translator/caudicle type: l/r

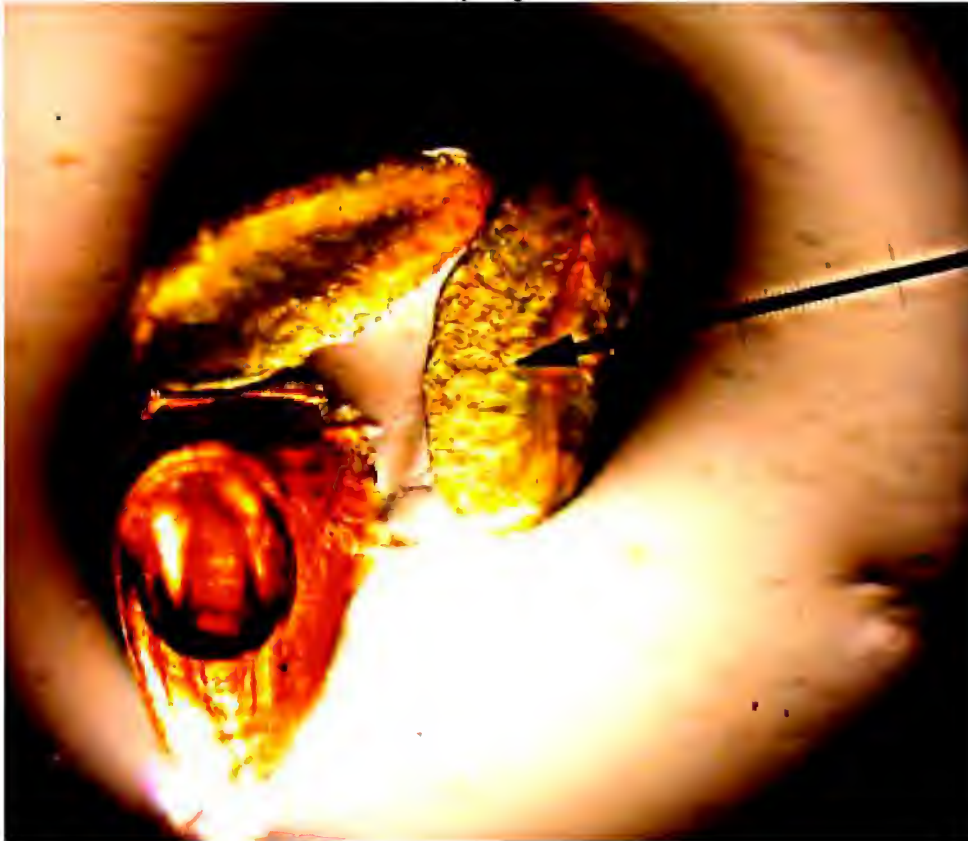
Pollinia inner end type: R

Caudicle bulb: G finely

Retinacula character: LN

Hoya mindorensis Schlechter 1906

Hoya sp. CAHUP 61933



Pollinarium enlarged about 165x.

Pollinium

length	0.63 mm
widest	0.29 mm

Translator/caudicle type: ls/o

Retinacula

length	0.55 mm
shoulder	0.25 mm
ext	0.05 mm

Pollinia apex type: R

Translator

length	0.30 mm
depth	0.03 mm

Caudicle bulb: ?

Retinacula character: LN

Caudicle

bulb. diam	0.07 mm
------------	---------

Measurements difficult, pollinium of different width possibly the one on top is folded a little. Retinaculum globose and hard to discern features. The translators appear to twist as they exit the retinaculum.

Hoya mindorensis subsp. cremea Kloppenburg & Mendoza
(unpublished) GM #107



Pollinarium enlarged ca.
120x.

Pollinium

length 0.60 mm
widest 0.25 mm

Retinaculum

length 0.34 mm
widest 0.25 mm
ext. 0.05 mm

Translator

length 0.24 mm
wide 0.01 mm

Caudicle

end 0.05 mm

Translator/caudicle type:
ls/r

Pollinia end type: R

Caudicle bulb: C

Retinacula character: LH

There are extensions to the retinaculum, they are curved under forming a rounded apex.

Hoya mindorensis subsp. horizontala Kloppenburg, Guevarra &
Carandang
(unpublished) BG #1



Pollinarium enlarged
140x.

Pollinium

length 0.60 mm
widest 0.25 mm

Retinaculum

Oval 0.35 x 30 mm

Here as with most of the subspecies the extensions are relatively long and are curved under the lower edge of the retinaculum.

Translator:

length 0.10 mm
wide 0.01 mm

Caudicle:

bulb diam. 0.10 x 0.05 mm

Translator/caudicle type:
ls/o

Pollinia end type: R

Caudicle bulb: finely G

Retinacula character: LH

Hoya mindorensis subsp. kanagongensis Kloppenburg &
Mendoza
(unpublished) GM #



Pollinarium enlarged 120x.

Pollinium

length 0.59 mm
widest 0.30 mm

Retinaculum

length 0.35 mm
widest 0.25 mm

Translator

length 0.17 mm
widest 0.05 mm

Caudicle

0.15 x 0.07 mm
rectangular

Translator/caudicle type: ls/r

Pollinia apex type: RT

Caudicle bulb: G finely

Retinacula character: LH/
HH

Hoya mindorensis subsp. altransa Kloppenburg, Guevarra &
 Carandang
 (unpublished) BG #3



Pollinarium
 enlarged 150x.

Pollinium

length 0.57 mm
 widest 0.27 mm

Retinaculum

length 0.39 mm
 widest 0.25 mm
 ext. 0.12 mm

Translator

length 0.17 mm
 wide 0.02 mm

Caudicle

bulb 0.17 x 0.07 mm

Translator/caudicle type:
 ls/r

Pollinium ends: R

Caudicle bulb: G scaly

Retinacula character: LH

The measurements of the retinaculum length is from the head (inner apex) to the crotch where the legs begin. In most mindorensis variants the extensions are curved under the ovate

outer (lower) end of the retinaculum and as here are relatively long. The caudicle surface here is covered with scale like surface.

Hoya mindorensis subsp. waymaniana Kloppenburg
(unpublished)



Pollinarium enlarged about 165x. Note the squeezed sides of the retinaculum referred to by Schlechter, the narrow (linear) translator arms and the clear caudicles. The pollinia are ovate and the pellucid edge is almost imbedded in the fatness of the pollinia.

Pollinium:

length	0.57 mm
widest	0.27 mm

Retinaculum:

length	0.34 mm
head shoulder and waist	the same width 0.20 mm
hip	0.23 mm
extensions	0.12 mm

Translators

narrow	0.15 mm
--------	---------

Caudicles also narrow,
bulb 0.06 wide.

Pollinium ends: R

Caudicle bulb: G scaly

Retinacula character: LN

Hoya mindorensis subsp. duoa Kloppenburg, Guevarra &
Carandang
(unpublished) BG #2



Pollinarium:
enlarged ca. 150x.

Pollinium
length 0.57 mm
widest 0.20 mm

Retinaculum
length 0.20 mm
widest 0.21 mm
ext. 0.05 mm

Translator
length 0.15 mm
widest 0.02 mm

Caudicle
bulb 0.16 x 0.05 mm

Translator/caudicle type:
ls/rectangle

Pollinia end type: R

Caudicles are scaly surfaced.

Retinacula character: LH

Legs (ext.) of retinaculum not seen in this photo are extended and touch at outer extension to form a somewhat cup like depression between them..

Hoya erythrostemma Kerr 1939

Flower via MM



Pollinarium
enlarged about 165x

**Translator/caudicle
type:** l/r

Pollinia apex type:
R

Caudicle bulb: G

**Retinacula
character:** LH

Pollinium

length 0.57 mm
widest 0.23 mm

Retinaculum

length 0.30 mm
shoulder 0.22 mm
waist 0.14 mm
hip 0.17 mm extensions little or none ?

Translators

length 0.19 mm
depth 0.02 mm

Caudicle

bulb diam. 0.08 mm

Hoya mindorensis subsp. quezonensis Kloppenburg & Mendoza
(unpublished) GM #161



Pollinarium enlarged 150x.

Pollinium

length 0.57 mm
widest 0.26 mm

Retinaculum

length 0.33 mm
widest 0.28 mm
ext. 0.13 mm

extensions curve under the
retinacular body

Translator

length 0.07 mm
widest 0.03 mm

Caudicle

oval 0.10 x 0.05 mm

Translator/caudicle type:
ls/r

Pollinia apex type: R

Retinacula type: LH

Caudicle: G finely

Hoya mindorensis subsp. globosa Kloppenburg, Guevarra &
 Carandang
 (unpublished) BG #13



Pollinarium enlarged 112x

Pollinium

length 0.56 mm
 widest 0.30 mm

Retinaculum

length 0.31 mm
 widest 0.30 mm
 ext. 0.08 mm

Translator

length 0.10 mm
 widest 0.03 mm

Caudicle

bulb 0.11 x 0.06 mm
 bulb surface is granulate.

Translator/caudicle type:
 ls/r

Pollinia inner apex type:
 R

Caudicle bulb: finely granulate G

Retinacula character: LN

Observations: in many of these mindorensis subspecies the retinaculum is ovate and the extensions are turned under the base at least when extracted, a few like this subspecies have definite extensions “legs” that are clearly visible at extraction. Even fewer have rather blocky extensions. The translators are larger as they approach to retinaculum sides. Pollinia grains are here well defined.

Hoya mindorensis subsp. tinkoyanensis Kloppenburg &
Mendoza (unpublished) GM #119



Pollinaria above enlarged ca. 110x. Note the pellucid edge on the left Pollinia picture above normally hidden and not easily discerned in this complex.

Pollinium

length	0.56 mm
widest	0.27 mm

Caudicle

bulb is oval 0.16 mm x 0.10 mm

Retinaculum in ovoid the picture on the right has 2 spurs at it's bottom (extensions).

left length	0.45 mm	0.30 mm widest	
right length	0.35 mm	0.40 mm widest	ext. 0.40 mm

Translators appear (rt.) to arise from the top of the retinaculum

length 0.20 mm

widest 0.02 mm

Translator/caudicle type: ls/r

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: LN

Hoya mindorensis subsp. luzonensis Kloppenburg & Mendoza
(unpublished) GM #196



Pollinium enlarged 130x

Pollinium

length 0.55 mm
widest 0.30 mm

Retinaculum

length 0.32 mm
widest 0.22 mm

Translator

length 0.15 mm
widest 0.04 mm

Caudicle

oval 0.10 x 0.05 mm

Translator/caudicle type:

ls/r

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: LH

Hoya mindorensis subsp. squama Kloppenburg, Guevarra &
Carandang
(unpublished) BG #7



Pollinarium left enlarged 140x.

Pollinia

length 0.55 mm
widest 0.24 mm

Retinaculum

length 0.24 mm
widest 0.20 mm
extensions 0.20 mm

Caudicle

bulb 0.15 X 0.05 mm

Type: G

Pollinia ends: R

Translator/caudicle type: ls/r rectangle

Retinacula character: LN

The measurements of the retinaculum length is from the hear (inner apex) to the crotch where the legs begin. In most mindorensis variants the extensions are curved under the ovate outer (lower) end of the retinaculum and as here are relatively long. The caudicle surface here is covered with scale like surface.

Hoya mindorensis subsp. gelba Kloppenburg & Mendoza
(unpublished) GM #178



Pollinaria enlarged ca.
180x.

Pollinium

length 0.54 mm
widest 0.29 mm

Retinaculum

length 0.22 mm
widest 0.29 mm

Translator

length 0.13 mm
widest 0.04 mm

Caudicle

oval 0.13 x 0.05 mm

Translator/ caudicle type:
ls/r

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: LH

The retinaculum is essentially round with the extensions at the bottom rolled under so nearly indistinguishable. The caudicle surfaces are granulate. Pollen grains in the pollinia are well defined.

Hoya mindorensis subsp. nagcarlanensis Kloppenburg &
Mendoza
(unpublished) GM #79



Pollinarium enlarged ca.
120x

Pollinium

length 0.54 mm
widest 0.22 mm

Retinaculum

length 0.30 mm
widest 0.21 mm
ext. 0.05 mm

Translator

length 0.15 mm
widest 0.04 mm

Caudicle

bulb diam. 0.07 mm

Translator/caudicle

type: ls/r

Pollinia end type: R

Caudicle bulb: G

Retinacula character:
LN

W 9456 Savai'i



Pollinia

length	0.54 mm
widest	0.21 mm

Retinaculum

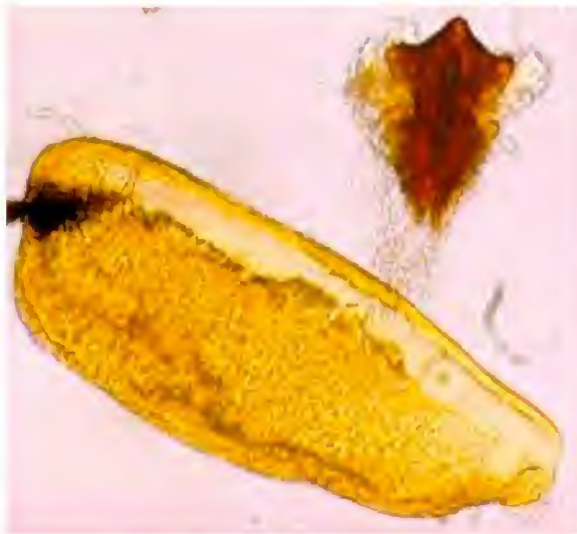
length	0.18 mm
shoulders	0.12 mm
waist	0.06 mm
hip	0.10 mm
extensions	0.03 mm

Translator/caudicle type: ls/r

Pollinia inner end type: T

Caudicle bulb: G

Retinacula: S



present. Some pollen grains have germinated.

A better view of the retinaculum enlarged as above. Translators are short and wider near the retinaculum only part of the clear caudicle on top is visible here, may have stayed on the pollinium end. Same retinaculum will yield some structural differences due to depth of focus as this is a 3 dimensional object. Note here the shoulders seem to turn up and as they go back at a lower level, they turn down. Pollinia has a clear pellucid edge from top to near the inner end and accompanied by the void area with no pollen structures

Hoya mindorensis subsp. lalawinanensis Kloppenburg & Mendoza
(unpublished) GM #175



Pollinarium enlarged 90x.

Pollinium

length 0.53 mm
widest 0.29 mm

Retinaculum

length 0.26 mm
widest 0.20 mm
ext. 0.03 mm

Translator

length 0.15 mm
wide 0.02 mm

Caudicle

oval 0.12 x 0.05 mm

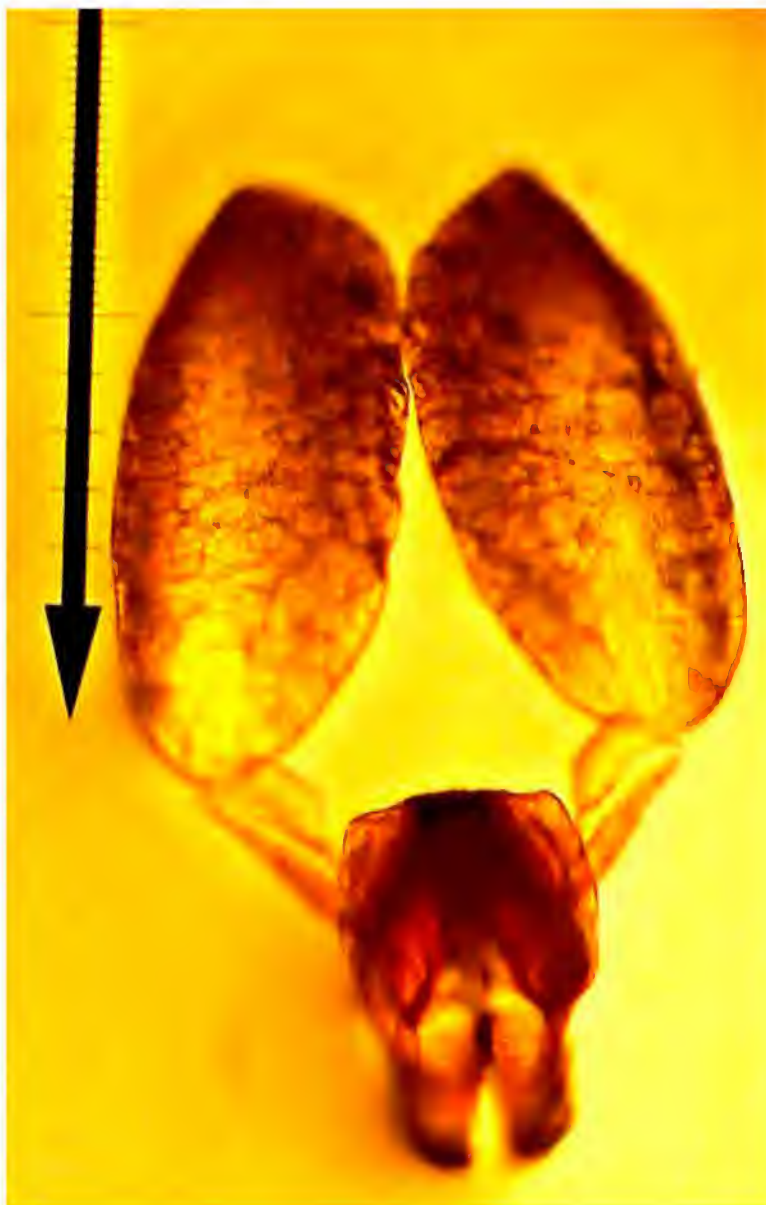
Translator/caudicle type:
ls/r

Pollinia apex type: R

Caudicle bulb: ?

Retinacula character: HH

Hoya mindorensis subsp. lagunaensis Kloppenburg & Mendoza
(unpublished) GM #177



Pollinarium enlarged 140x.

Pollinium

length 0.52 mm
widest 0.26 mm

Retinaculum

length 0.25 mm
widest 0.24 mm
extensions 0.07 mm
legs 0.18 mm

Translator

length 0.18 mm
widest 0.03 mm

Caudicle

Oval shaped 0.10 x 0.05 mm

The retinaculum has a broad head, no shoulder, waist or hip as present with the majority of hoyas species. The extensions are also different with wide sides and blunt outer apex. Above the crotch they seem to extend like legs which measure 0.18 cm long.

Translator/caudicle type: ls/r, caudicles with a fine granular surface, not clear.

Pollinia apex type: RT

Caudicle bulb: G

Retinacula character: LN

The pollinia has distinct pollen structures.

Hoya mindorensis subsp. nuevaensis Kloppenburg & Mendoza
(unpublished) GM #194



Pollinarium
enlarged 120x.

Pollinium

length 0.52 mm
widest 0.17 mm

Retinaculum

length 0.35 mm
widest 0.25 mm

Translators

length 0.16 mm
widest 0.02 mm

Caudicle

rectangle 0.10 x 0.05 mm

Translator/caudicle type:
ls/r

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: LN

I have decided to add a new classification for the *Hoya mindorensis* caudicles since they are not oval “o” nor funnel shaped “cw” so the new classification will be rectangular “r”.

Here the caudicles have a concave dorsal and rounder outer end and cut off (straight) inner edge. The surface is finely granulate. The pollinia is well defined within the pollinium.

Hoya mindorensis Schlechter 1906

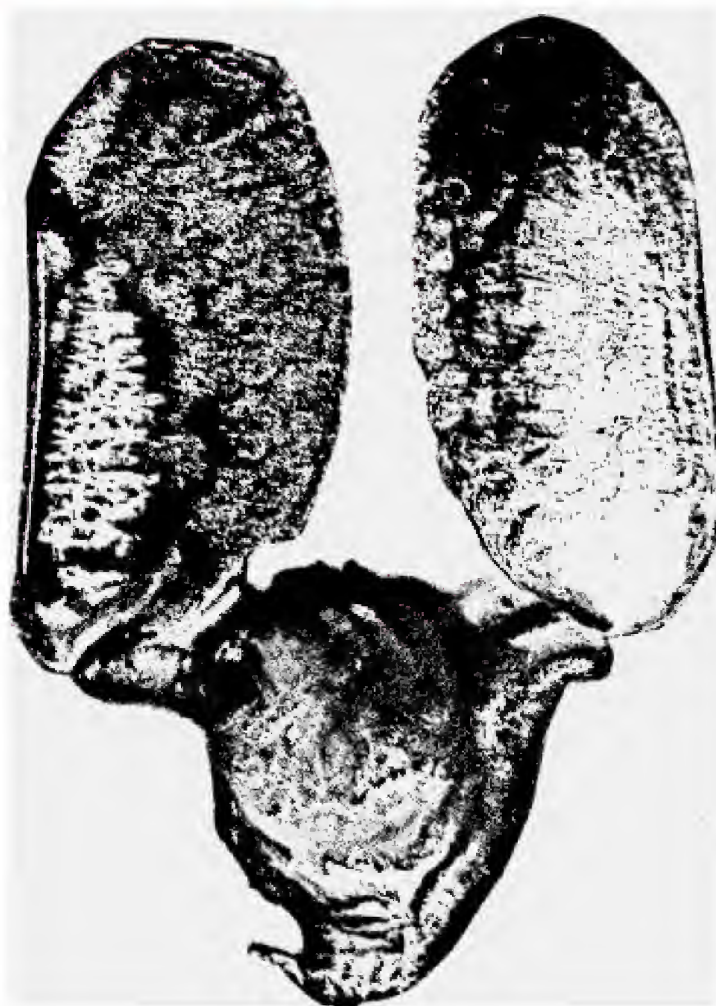
Clone 890508 flowers sent by Ann Wayman.



Pollinarium enlarged about 65x.

Note the squeezed sides of the retinaculum referred to by Schlechter, the narrow (linear) translator arms and the clear caudicles. The pollinia are ovate and the pellucid edge is almost imbedded in the fatness of the pollinia.

Flower from Diffin, Querino Prov. Luzon Philippines via Maximo Wayett. About 165x.



Pollinium

length: 0.52 mm

widest: 0.24-.27 mm

Retinaculum

length: 0.30 mm

shoulder: 0.22 mm

waist: 0.17 mm

hip: 0.22 mm

ext.: 0.08 mm ?

Translators

length: 0.15 mm

depth: 0.05 mm

Caudicle

appears to be linear,
ca. 0.05 mm thick.

Translator/caudicle type:
ls/r

Pollinia apex type: R

Caudicle bulb: G

Retinacula character: LN

Hoya mindorensis subsp. rosea Kloppenburg & Mendoza
(unpublished) GM #121



Pollinarium enlarged ca,
150x.

Pollinium

length 0.51 mm
widest 0.24 mm

Retinaculum

length 0.29 mm
widest 0.20 mm
ext 0.02 mm

Translator

length 0.17 mm
widest 0.04 mm

Caudicle

bulb shape 0.10 x 0.06 mm

Translator/caudicle type:
ls/r

Pollinium end type: R

Caudicle bulb: very finely
granulate

Retinacula character: LH

Hoya mindorensis subsp. tacta Kloppenburg, Guevarra &
Carandang
(unpublished) BG #8



Pollinarium enlarged 150x.

Pollinium

length 0.51 mm
widest 0.25 mm

Retinaculum

length 0.30 mm
widest 0.20 mm
oval shaped extensions
hidden.

Translator

length 0.13 mm
widest 0.03 mm

Caudicle

bulb 0.11 x 0.05 mm

Translator/caudicle type:
ls/r.

Pollinia inner end type: R

Caudicle bulb: G fine

Retinacula character: LH

Hoya mindorensis subsp. mendozae Kloppenburg & Ferreras 2015



Pollinarium enlarged ca.
140x

Pollinarium

length 0.50 mm
widest 0.25 mm

Retinaculum

length 0.38 mm
widest 0.19 mm

Translators

length 0.15 mm
depth 0.03 mm

Caudicle

bulb diam. 0.09 mm

Translator/caudicle Type:
ls/r

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: LH

Retinacula apex end may
have extensions fused or
tight together here.

Hoya mindorensis subsp. condupla Kloppenburg, Guevarra &
Carandang
(unpublished) BG #6



Pollinarium here enlarged
140x

Pollinium

length 0.50 mm
widest 0.25 mm

Retinaculum

length 0.24 mm
wide 0.17 mm
ext. 0.10 mm

Translator

length 0.14 mm
wide 0.02 mm

Caudicle

bulb 0.11 x 0.05 mm

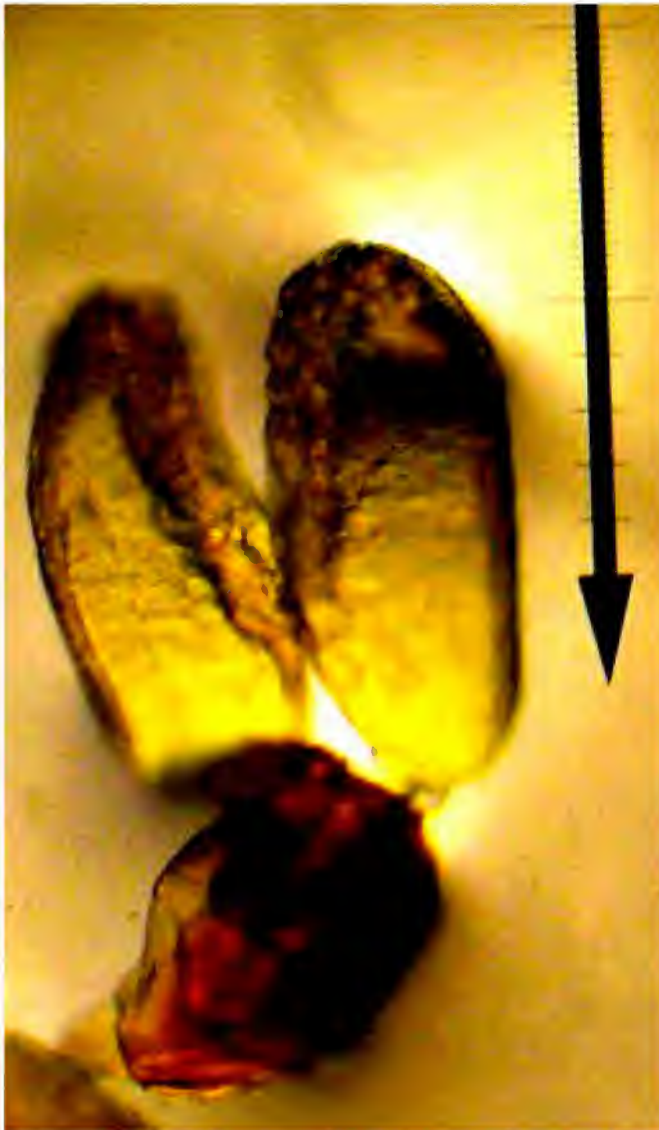
Translator/caudicle Type:
ls/r rectangular

Pollinia end type: R

Caudicle bulb: G finely

Retinacula character: LH

**Hoya mindorensis subsp. hirsuta Kloppenburg, Gueverra &
Carandang**
(unpublished) BG #14



Pollinarium enlarged ca. 130x.

Pollinium

length	0.50 mm
widest	0.24 mm

Retinaculum

length	0.30 mm
widest	0.25 mm
ext.	0.15 mm

Translator

length	0.10 mm
widest	0.02 mm

Caudicle

bulb	0.10 x 0.05 mm
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Translator/caudicle type: ls/r

Pollinia inner end Type: R

Retinacula character: LH

Here as in all of these subspecies the retinacular extensions turn under the rounded body in one direction and are semi hidden, this may be due to the twisting of the retinaculum upon extraction, all have head areas that are semi block shaped with dorsal short horn like

projections.

Hoya mindorensis subsp. bakerensis Kloppenburg & Mendoza
(unpublished) GM #186



Pollinarium enlarged ca 135x.

Pollinium

length 0.50 mm
widest 0.25 mm

Pollinarium

length 0.29 mm
widest 0.18 mm

Translator

length 0.17 mm
widest 0.03 mm

Caudicle

oval 0.13 x 0.07 mm

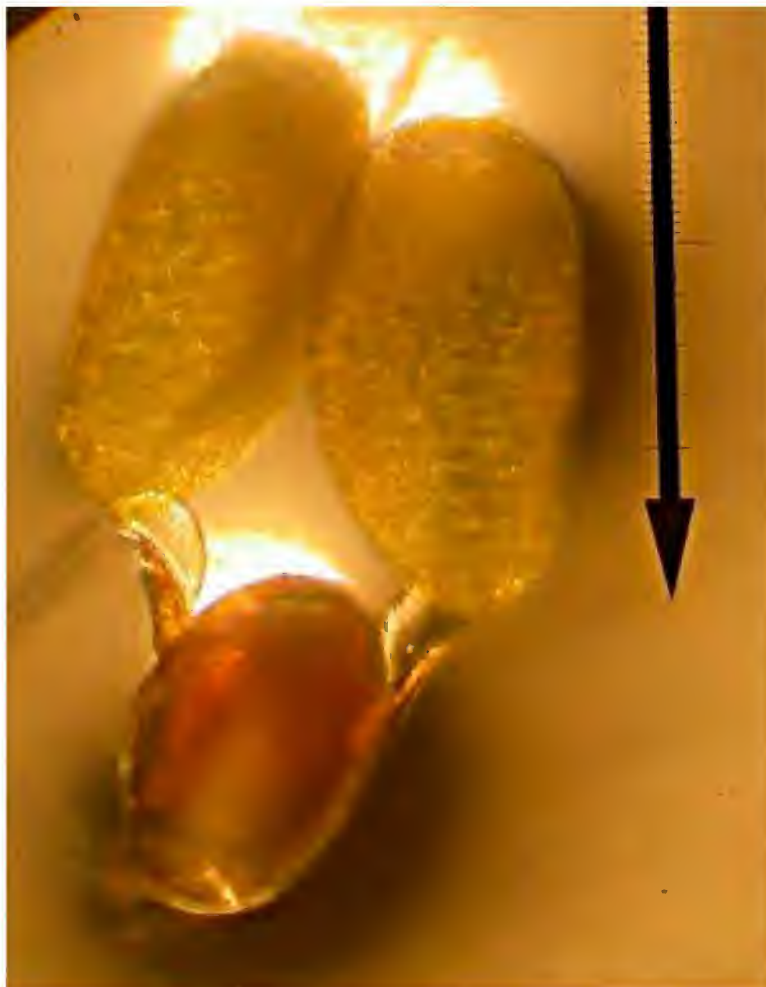
Translator/caudicle type:
ls/r

Pollinia apex type: R

Caudicle bulb: fine G

Retinacula character: LN

Hoya mindorensis subsp. mabilogensis Kloppenburg & Mendoza
(unpublished) GM #89



Pollinarium enlarged
ca. 130x.

Pollinium

length 0.49 mm
widest 0.30 mm

Retinaculum

length 0.30 mm
widest 0.25 mm
ext. 0.07 mm

Translator

length 0.11 mm
wide 0.04 mm

Caudicle bulb ca. 0.10 mm

The retinaculum in oval shapes with a small 0.07 indentation in the bottom I assumes is were the extensions curve under. .

Translator/caudicle type: ls/r

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: LH

Hoya mindorensis subsp. siniloanensis Kloppenburg
(unpublished) #16

Pollinarium enlarged 170x.



normal position.

Pollinium

length 0.47 mm
widest 0.19 mm

Retinaculum

length 0.23 mm
widest 0.18 mm
ext. 0.16 mm

Translator

length 0.12 mm
widest 0.02 mm

Caudicle

bulb 0.08 x 0.05

Translator/caudicle type:
ls/r

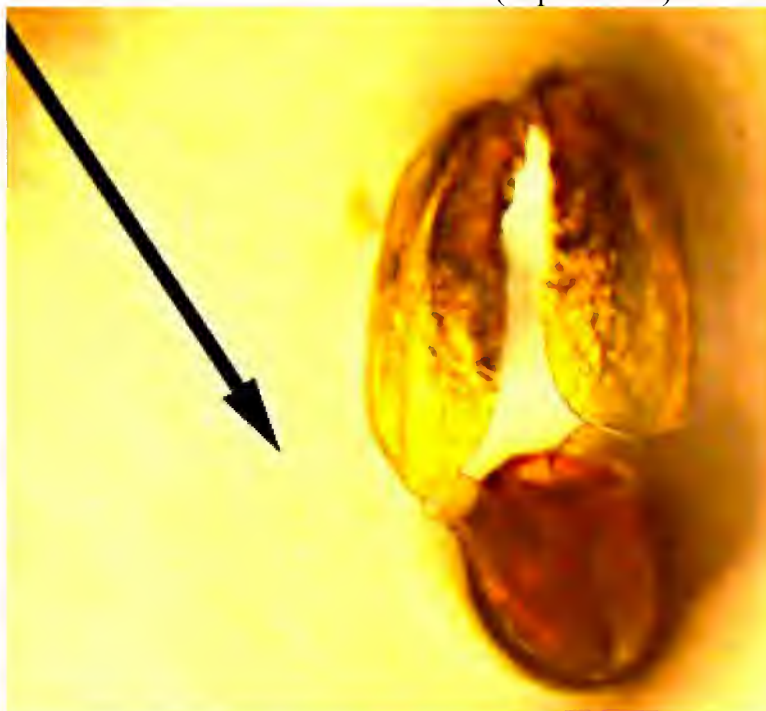
Pollinia inner end: R

Caudicle bulb: G

Retinacula character: LN

Here the retinaculum is twisted sideways and the extensions are long and curled to the right. Normally in this species the extensions are curled under the inner apex and are not visible. It seems evident that these structures are normally evidently rather long. The caudicle on the right has turned over from its

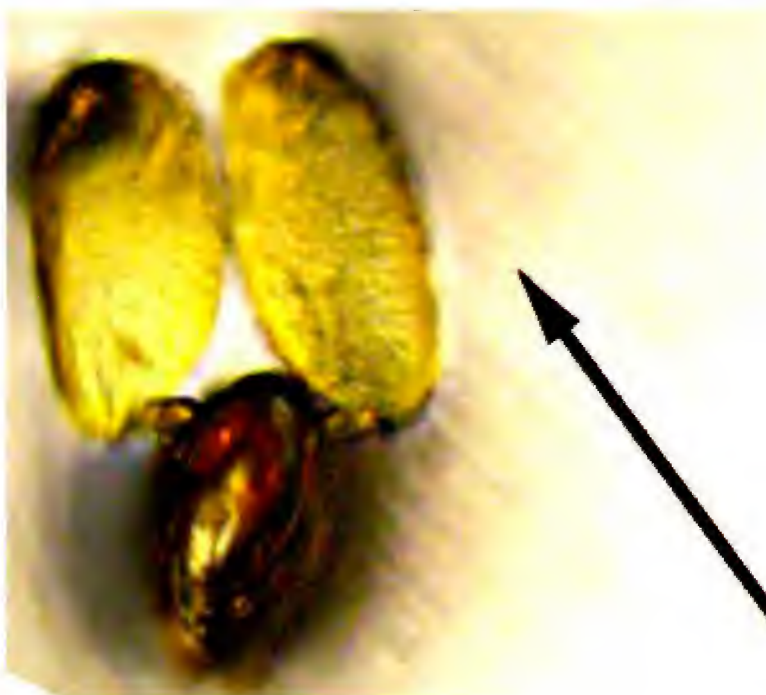
Hoya mindorensis subsp. granulata Kloppenburg, Guevarra &
Carandang
(unpublished)



Pollinarium **enlarged**
100x

Retinaculum length
measured from head apex
to the ext. (legs). So total
length below would be 0.35
mm

Here the extensions are
forward and rather
enclosed. They are not
wrapped under the main
portion of the retinaculum.



Pollinarium **enlarged**
110x.

Pollinium
length 0.46 mm
widest 0.23 mm

Retinaculum
length 0.25 mm
widest 0.26 mm
ext. 0.10 mm

Translator
length 0.07 mm
width 0.01 mm

Caudicle
bulb 0.08 x 0.05 mm

Translator/ caudicle type: ls/r rectangle

Pollinia end type: R
Caudicle bulb: G

Retinacula character: LH

Hoya mindorensis subsp. corollastriata Kloppenburg, Mendoza &
Cajano
ISSN 2329-7336



Pollinarium enlarged ca.
160x.

Pollinium

length	0.45 mm
widest	0.19 mm

Retinaculum

length	0.28 mm
widest	0.21 mm
ext.	0.02 mm

Translator

length	0.15 mm
wide	0.05 mm

Caudicle

bulb diam.	0.11 mm
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Translator/caudicle
type: ls/r

Pollinia apex type: R

Retinacula: LH

Caudicle: G

Hoya mindorensis subsp. corollastriata Kloppenburg & Mendoza
(unpublished) GM #120



Pollinarium enlarged ca.
160x.

Pollinium

length	0.45 mm
widest	0.19 mm

Retinaculum

length	0.28 mm
widest	0.21 mm
ext.	0.02 mm

Translator

length	0.15 mm
wide	0.05 mm

Caudicle

bulb diam.	0.11 mm
------------	---------

Translator/caudicle
type: ls/r

Pollinia apex type: R

Caudicle bulb: G fine

Retinacula character:
LH

Hoya blashernaezii subsp. straminea Kloppenburg & Mendoza
(unpublished) GM #180



Pollinarium enlarged 160x

Pollinium

length 0.41 mm
widest 0.21 mm

Retinaculum

length 0.13 mm
shoulder 0.16 mm
waist 0.08 mm
hip 0.10 mm
ext. 0.05 mm

Translator

length 0.11 mm
widest 0.05 mm

Caudicle

bulb diam. 0.07 x 0.05 mm

Translator/caudicle type: ls/r

Pollinia apex type: R

Retinacula type: HU

Caudicle: C

Hoya spartioides (Kuntz) Kloppenburg 2001



Pollinarium enlarged about 165x. The pollinia here are broad and short with pellucid outer edges and a cellular vacuole inward. The retinacula and pollinia are very similar to *Hoya mindorensis* Schlechter. Here the caudicles are better formed, more structurally visible.

Pollinia

length	0.36 mm
widest	0.23 mm

Retinaculum

length	0.25 mm
width	0.25 mm

Translator

length	0.10 mm
depth	0.03 mm ca.
width	0.03 mm ca.

Caudicles

bulb diam.	0.09mm
with distinct tail.	

The retinaculum is nearly round with two raised sections on the upper outer edge, with the center rather open. Translators and caudicles attached about the middle, lower apex formed into a half crescent .

Translator/caudicle type: ls/r

Pollinia apex type: R

Caudicle bulb: G

Retinacula type: HU

Pollinia Types 2017-8

Cupped

1. **Hoya waymaniae** Kloppenburg 1995

Hoya waymaniae Kloppenburg 1995

Flower from MM **Type** clone.



Magnified approximately 165x.

Pollinium

length: 0.48 mm
widest: 0.12 mm

Retinaculum

length: 0.09 mm
shoulder: 0.07 mm
waist: ?
hip: 0.07 mm
ext.: 0.03 mm

Translators

length: 0.25 mm
depth: 0.04 mm

Caudicle

linear: 0.05 mm

Translator/caudicle type: unique

Pollinia inner end type: R

Caudicle bulb: G

Retinacula character: S

Pollinia Types 2017-9
t/o

1. **Hoya espaldoniana** Kloppenburg, Siar & Cajano 2014

Hoya espadoniana Kloppenburg, Siar & Cajano 2014



Pollinarium
enlarged ca. 170x.

The pellucid edge barely extends to the pollinium inner apex and not to the inner apex nor to the caudicle attachment point. The translators are surrounded with irregular ovate non-clear tissue. It appears the translators are linear but also have short perpendicular extensions, are the irregular shaped portions the caudicle or are they hidden by these structures. **A very unusual and rare structural combination.**

Pollinium: length.....0.42 mm and widest..... 0.18 mm widest

Retinaculum: length.....0.10 mm; shoulder.....0.09 mm; wide, hip and waste similar extensions.....0.04 mm.

Translators: 0.15 mm long and 0.02 cm wide. **Caudicle:** bulb diameter ?0.10 mm.

Caudicle type: G

Retinacula character: S

Translator/caudicle: fe/o

Pollinia inner end type: T